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No. 54

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CONTENTS

HARDWARE

Microcomputer Mass Utilization Problems Summarized.................. 1

Integrated Circuit Repair by Laser Beam.............................. 4

Frunze Computer Plant Workers Produce High-Quality Equipment........ 5

New Pocket Calculators... 6

Collaboration of Belorussia and Bulgaria............................. 7

Tbilisi Control Computer Plant....................................... 8

SOFTWARE

New State Standards for Computer Program Documentation Introduced... 9

Fourth-generation 'El'Brus' Software; Imported Microprocessors....... 10

Systems Software of VTSKP and Trends for its Development............ 12

APPLICATIONS

Request for Computer Compatible Order Forms Ignored................. 19

Bank Accounting Software, Hardware System Described................. 20

Organization and Procedure for Development of Five-Year and Annual Plans for Computer Centers.. 22

Working Out the Political and Economic Problems of the State Automated Management System.. 24

Computer Technology in Managing the Oblast Economy.................. 26

Systems Analysis, Development in the Transportation Construction Industry.. 35

Uzbek Academician on ADP Support to Chemical Industry............... 37

Using Computers, Automated Systems More Efficiently................. 38

Automation of Banking Operations.................................... 41

Computer Control of Bus Traffic.................... 44

Construction in the Statewide Automated System...................... 46

Post-Olympic Use of IBM/370... 47

Questions on Information Collection and Processing.................. 49

On the Basic Directions for Development of the ASGS................. 50

Organizing Problems of Small Computer Maintenance................... 55

Exchange of Patent Information by Cassettes......................... 56

Program Package for Automatic Analysis of Electrocardiograms........ 58

Automated Arrangement of Aircraft Equipment......................... 65

Progress on Powerful New Estonian Computer System................... 70

Deputy Director Discusses Scientific Production Organization........ 71

Automated Scientific Research Data Processing System in Georgia Discussed.. 73

Urban Management Automated Control System Problem Solutions Suggested 75

Utilizing Computer Technology in Administration..................... 76

The Automated Control System in Motor Transport..................... 79

A Computer Plans Container Shipments................................ 80

First USSR Electronic Office Created in Ministry of Electrical Equipment Industry.. 82

New Computer Systems To Aid Metallurgists, Power Engineers.......... 84

Information and Control Center (IUTs) Concept Initiated at Kuybyshev Plant.. 86

Grain Harvesting, Transport, Storing Automated Control System Announced.. 87

Costs, Efficiency of Setting Up Automated Industrial Control Systems.. 88

Briefs

'Elektro-3' OASU Third Phase 92

CONFERENCES

State Software Bank's Improvement Under Discussion at Conference.... 93

CEMA State Planning Agency ASPR Conference in Tashkent Announced.... 94

HARDWARE

MICROCOMPUTER MASS UTILIZATION PROBLEMS SUMMARIZED

Moscow PRAVDA in Russian 3 Nov 80 p 7

[Article by V. Myasnikov, director, USSR State Committee on Science and Technology Central Administration for Computer Technology and Control Systems: "Great Capabilities of Microcomputers"]

[Excerpts] The utilization of microcomputers has reached the greatest scale in machine tool building, in particular in machine tools with numerical program control. In 1981 in our country will be produced more than 2500 machine tools with microelectronic control and during the entire 11th Five-Year Plan period their number should increase dozens of times. A microcomputer lowers the cost of a system for controlling a single machine tool by 10,000 rubles on average, considerably improves the reliability of equipment and reduces the production space requirement.

In the decree of the CPSU Central Committee regarding measures for increasing production and widely employing automatic manipulators, a number of ministries were confronted with the problem of creating and series producing systems for controlling manipulators based on microcomputers and microprocessors.

It should be mentioned that the Ministry of the Electronics Industry has successfully solved the scientific and technical problems associated with the mastery of such complex and delicate-fabrication instruments as microprocessors and microcomputers. In the USSR in the current year alone will be produced hundreds of thousands of microprocessor combinations of 10 types, thousands of microcomputers and millions of microcalculators of 30 types.

Nevertheless, there is a discrepancy between the rapidly growing production of microcomputers and their use. The fact is that many industries are still not ready to use them for controlling machines, equipment and processes which are being created.

From this arise a number of problems requiring a rapid solution. For example, it is first necessary to prepare methodological materials on the creation of built-in automatic control systems and to tend to courses for designers (primarily chief designers) in which the capabilities and features of control by means of this equipment would be disclosed. In addition, the Ministry of the Electronics Industry and the Ministry of Instrument Making, Automation Equipment and Control Systems would have to arrange for the broad dissemination of intelligible information regarding microprocessors and microcomputers.

It is very important to create specialized teams for developing built-in automatic control systems. It seems that such subdivisions should be organized at design bureaus. An important role here will be played by the higher educational institution once the training of the appropriate specialists has been arranged for.

It should be kept in mind that a built-in automatic control system and a microcomputer are not the same thing. In order to create a built-in system are required data transmitters determining the parameters of the equipment's operation, slave mechanisms and communications equipment. Finally, peripheral equipment reflecting the parameters of the technological process is required.

This is a complicated problem. For example, data transmitters and slave mechanisms are closely related to the design of the equipment and must be developed in coordination with its creation. Taking into account the fact that the Ministry of Instrument Making, Automation Equipment and Control Systems is concentrating all its efforts on the manufacture of general industrial instruments, it is advisable to arrange for the production of special-purpose data transmitters and slave devices directly in industries.

It cannot be left unsaid that the data transmitters and slave mechanisms used today do not make it possible to utilize to the full extent the capabilities of microprocessors and microcomputers, or are themselves based but slighcly on the achievements of microelectronics.

Acute also is the problem of preparing and debugging software for microcomputers.

Every year more and more teams will be included in working on the design of built-in control systems based on microcomputers. In connection with this the problem arises of selecting the head organizations which will take upon themselves methodological coordination in the area of the development of applied software for control systems and of the classification of packages of applied programs, and relating to standardization in this area. This is a job for the Ministry of Instrument Making, Automation Equipment and Control Systems and the Ministry of the Electronics Industry.

Microcomputers are today produced by organizations of a number of ministries employing various industrial standards. Experience dictates the need to prepare and put into effect a series of appropriate State standards. Affiliated with this objective is the ensurance of compatibility between various microcomputers and computers of a higher level.

In the next few years the production of microprocessors and microcomputers will be considerably expanded; therefore it is necessary not to delay in setting up the production of testing and debugging equipment accessible to the mass user, as well as in arranging for their centralized servicing.

As we see, in the mass utilization of microcomputers many problems arise which require urgent solution. For this purpose the USSR State Committee on Science and Technology in conjunction with the USSR Gosplan and several ministries, primarily the Ministry of Instrument Making, Automation Equipment and Control Systems, are preparing the draft of a combined purposeful program for the utilization of microprocessors and microcomputers for the next five-year plan period. Also completing its work is the interdepartmental commission which was entrusted with preparing

constructive suggestions for solving problems related to this. It is clear that only by combined efforts is it possible to achieve the effective utilization of such advanced general-purpose pieces of equipment as microprocessors and microcomputers.
[54-8831]

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INTEGRATED CIRCUIT REPAIR BY LASER BEAM

Moscow GUDOK in Russian 10 Oct 80 p 4

[Article: "The Laser Repairs"]

[Excerpt] Defects in microelectronic circuits can be eliminated using a powerful laser beam focused on a .005-.007 mm point. This has been proven by experiments made by scientists at the Institute of Solid State Physics of the Latvian State University. They used the light tool for "mending" integrated circuits used in modern computer equipment.

The tiny crystal wafers, replacing a large number of transistors and other parts, usually have to be rejected in event of malfunction. This innovation makes it possible to burn out individual circuit particles, change the parameters of the elements that have failed, and thereby restore normal operation to the miniature construction.
[36-8545]

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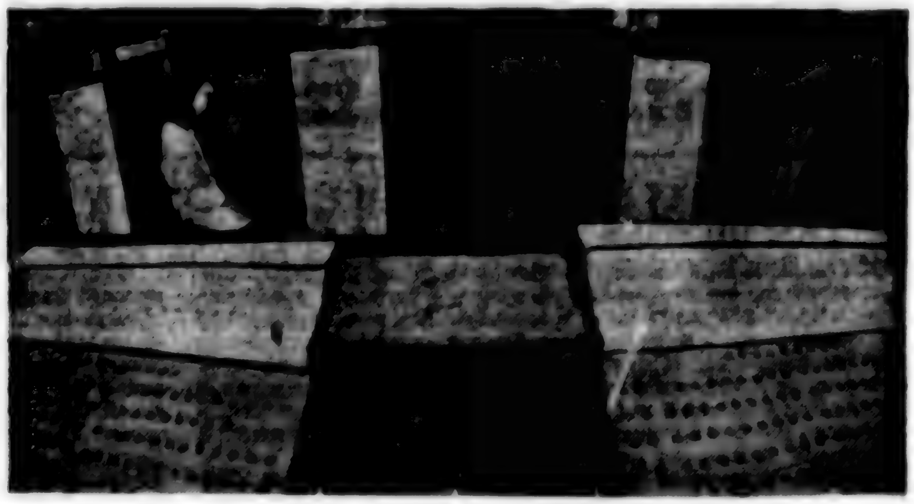
FRUNZE COMPUTER PLANT WORKERS PRODUCE HIGH-QUALITY EQUIPMENT

Moscow EKONOMICHESKAYA GAZETA in Russian No 29, Jul 80 p 5

/Photograph and caption/

/Text/



Almost all the workers at the Frunze Computer Plant imeni 50-Letiya SSSR (in the Kirgiz SSR) produce equipment that passes the first inspection. A work result evaluation system that is based on a ball scale contributes much to this enterprise's success. In the photograph: the computer assembly shop.
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NEW POCKET CALCULATORS

Moscow NEDEL'YA in Russian No 17, 1980 p 18

[Article by L. Mayskiy]

[Text] A miniature calculator surprises no one. It can be seen in a student's briefcase, at the engineer's workplace and in the scientist's pocket.

And yet a microcalculator which will start to be produced in the very near future differs greatly from its predecessors. Firstly, it is smaller and lighter than they. It has dimensions of 110 x 66.5 x 10.5 mm and a total weight of 65 grams. Secondly, and this is the main thing, it is highly reliable. Its battery (the same as is used in electronic wristwatches) provides 500 hours of operation--10 times longer than batteries of similar calculators now being produced.

Besides four arithmetic operations, the new "Elektronika" automatically makes calculations with a constant, calculates percentages and extracts roots.

The "Komp'yuter" ("Computer") is made in the form of a note-book and is readily placed in a pocket. It is not inferior to the better foreign models and has a longer service life: the producer guarantees 8 years of work!

One hundred thousand new calculators will be produced in 1980, with an approximate price of 50 rubles.
[396-2174]

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COLLABORATION OF BELORUSSIA AND BULGARIA

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 2, 1980 p 51

[Article by V. Yakovlev]

[Excerpt] The scientific and technical collaboration of Belorussia and Bulgaria is being accomplished in accordance with 21 programs. Joint investigations are being conducted in the areas of electronics, powder metallurgy, physical metallurgy and polymeric materials.

Scientific collectives of Sofiya and Minsk have been doing joint work for 10 years on the creation of new examples of electronic computer equipment. A visible result of the collaboration is cooperation in the production of YeS (Unified System) computers. In particular, Bulgaria supplies magnetic tape and disk stores to the Minsk Plant imeni G. K. Ordzhonikidze. Those devices were demonstrated at the exhibition of achievements of Bulgarian science and industry that was held last year in the capital of Belorussia.

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[396-2174]

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TBILISI CONTROL COMPUTER PLANT

Tbilisi ZARYA VOSTOKA in Russian 18 Sep 79 p 2

[Photo and news item from GruzINFORM [Georgian Information Office]]

[Text] The collective at the Tbilisi "Elva" scientific production association control computer plant produces computer complexes. The Tbilisi machines are being used successfully in the Slavyanskaya, Ryazanskaya, Stavropol'skaya and other GRES's in the country and in various nuclear electric power stations. They have also become very popular abroad.

The State Mark of Quality is given to 55 percent of all products.

In the photo: check-out engineers Ushangi Aliadze and Nodar Benashvili test a computer complex.

Photo by S. Edisherashvili

[395-8545]

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NEW STATE STANDARDS FOR COMPUTER PROGRAM DOCUMENTATION INTRODUCED

Moscow GUDOK in Russian 29 May 80 p 2

[Article by I. Vakhlakov and B. Sokolov, engineers: "All-Union State Standards for Computer Programs"]

[Excerpt] In recent years, a number of major state standards have been adopted that have a direct impact on compiling documentation. Unified systems of design and project documentation, and even of official correspondence, have already been introduced and have had a major impact on the national economy. It seems that a special place in this series has been prepared for the new Unified System of Program Documentation (YeSPD).

It has 29 GOST [all-union state standards]. For now, we are speaking of the first phase of standards in the YeSPD. They were developed over the last four years. More than 20 NII [scientific research institutes] and other organizations of a number of ministries and departments participated in developing the YeSPD. But why were new standards needed?

Computers are penetrating deeper and deeper into all sectors of the national economy. Today, without the ASU [automated management system], it is impossible to imagine the work of the planning agencies or the functioning of industry, transportation, commerce.... But what does setting up an ASU entail? For systems based on third-generation machines, outlays for development of programs, data banks and documentation make up 70 percent of the total expense, according to the calculations of the specialists. The standards are called upon to point out ways and methods of more efficient utilization of national economic outlays for these purposes. The Unified System of Program Documentation, approved by the USSR Gosstandart [State Committee for Standards], is unique in the practice of native and world standardization.

Now in the sectors, the chief and base organizations for standardization have begun drafting plans for organizational and methodological measures on introducing the YeSPD standards. Prompt development and implementation of these plans will ensure successful introduction of the YeSPD and, within a short time, substantially ease the burden of a large army of programmers, monitors of standards, ASU engineers and technicians, and students. According to preliminary data, the standards in the YeSPD will raise programmer productivity 35 to 40 percent.
[394-8545]
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CSO: 1863

FOURTH-GENERATION 'EL'BRUS' SOFTWARE; IMPORTED MICROPROCESSORS

Tallinn SOVETSKAYA ESTONIYA in Russian 6 Sep 80 p 2

[Article by Kh. Aben, director, Estonian SSR Academy of Sciences Institute of Cybernetics, doctor of technical sciences and Estonian SSR Academy of Sciences corresponding member: "Direct Result"]

[Excerpts] The SAPR [automated design system] and APROKS [expansion unknown] programming systems developed by Academician B. Tamm and Yu. Pruuden are used at a number of machine building plants and shipyards in our country in preparing programs for program controlled machine tools. As a continuation of this work, now has been created an integrated programming system, the ISP, which makes it possible to solve complex engineering problems in the form of a dialogue with the computer. The effectiveness of the latter system is typified by the fact that it is used as the basic system for automated design in the machine building field in all CEMA countries. The system has already been used in designing turbine vanes in Leningrad, conveyors at the AvtoVAZ [expansion unknown] Plant in Tol'yatti and in a number of other organizations. Extensive introduction in all CEMA countries will begin at the end of the current year.

Having earned the high esteem of specialists is also the PRIZ [expansion unknown] modular programming system created under the guidance of Doctor of Technical Sciences E. Tyugu. This system makes it possible to put together from individual program modules complex packages of applied programs for solving various problems. It is especially effective in creating automated design programs and has been successfully used in designing power semiconductors at the scientific research institute of the Tallinn Electrical Equipment Plant imeni M.I. Kalinin. By means of the PRIZ system has been created the DABU [data bank control] system for controlling a data bank. By assignment of the USSR Council of Ministers State Committee on Science and Technology is now being developed a variant of the PRIZ system for the domestic "El'brus" fourth-generation computer.

An area in which the need for employing computers is most urgent is the processing of economic data. On this depends to a great deal the efficiency of the work of planning agencies, ministries and industrial enterprises. The ASOED [automated system for processing economic data] developed at the Institute of Cybernetics by V. Kuusik, E. Savr and L. Kheynla is being used in more than 20 organizations with an annual savings of more than one million rubles. The strong side of this system is the fact that its user need know nothing about programming--the problem is formulated for the computer by filling in a simple questionnaire.

In examining many social and economic problems valuable information can be provided by a questionnaire survey. Therefore it is quite important to have an effective system of programs for processing questionnaires. Such a system, created by M. Khoolm and I. Petersen, has been handed to about 50 organizations. This system was used in surveying the utilization of the archives of science libraries in the USSR, in studying the effectiveness of the bonus system at industrial enterprises, pendulous migration in Tallinn, juvenile delinquency, etc. Especially interesting are results obtained in using the system for processing data of medical examinations (a study was made of the disease rate in Tallinn, of the effectiveness of methods of treating rheumatic fever in children, of questions relating to sports injuries, etc.).

A system, created at the Institute of Cybernetics, for controlling the production of formalin has been used in 14 formalin plants in the European sector of the USSR. Now has been put into service an ASU [automated control system] of the next generation, which by means of a YeS-1010 computer controls the production of urea in the nitrogen fertilizer shop at the Slantsekhim Association imeni V.I. Lenin in Kokhtla-Yarve. Incidentally, the latter system is one of the most perfected ASU's in the USSR which are based on a YeS-1010 computer.

The demand of USSR industry for mini- and microcomputers still exceeds their production. For example, domestic electrical turbines manufactured for export are furnished with imported microprocessors purchased in exchange for currency.

In order to assist in introducing mini- and microcomputers into domestic industry, as well as into science, in 1976 at the Institute of Cybernetics was created the SKB [special design bureau] for computer technology. A considerable portion of the leading personnel at this SKB is made up of scientists who were already previously working on the design of computers at the scientific research institute of the Electrical Equipment Plant imeni M.I. Kalinin.

In spite of its short period of existence, the SKB for computer technology under the direction of K. Leppik and Kh. Tani has already been included in the program of CEMA countries, and many developments relating to the creation of a new series of minicomputers have already been handed over to clients. At the present time the work volume of this SKB equals 1.5 million rubles per year.

The work of Estonian cybernetic engineers is on the international level. Every year the institute's coworkers report their results at a number of international scientific forums and many scientific articles are published in foreign journals.

At the Soviet-Finnish firm Elorg Data in Helsinki at the present time testing is under way on a system of programs for processing questionnaires. One organization in the GDR has been handed a real-time operating system and there is a contract for the creation of an ASU for a turbine thermal electric power plant. This list can go on.

Here it is apropos to recall that the institute cooperates closely with other organizations in the republic doing research on cybernetics. Let us mention above all Tallinn Polytechnical Institute and Tartu State University, the scientific research institute of the Electrical Equipment Plant imeni M.I. Kalinin and the "Algoritm" [Algorithm] Association.
[54-8831]

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SYSTEMS SOFTWARE OF VTSKP AND TRENDS FOR ITS DEVELOPMENT

Moscow VESTNIK STATISTIKI in Russian No 9, 1980 pp 28-33

[Article by S. Bushev]

[Text] Progress in the field of using computer equipment, widespread introduction of it in all sectors of the national economy and accumulation of significant experience of automated data processing inevitably led to centralized, collective use of computers.

It is more and more difficult for separate, individual users to operate expensive computer equipment. The expanding scales of its use require significant, ever increasing labor resources to this process. Therefore, the problem of increasing labor productivity is advanced to the forefront in the sphere of computer use.

It is natural that the indicated problem cannot be solved without concentration of computer capacities and without transfer of the given sphere to industrial bases.

It is now difficult to imagine the operation of a VTs [computer center] without operating systems, a wide range of translators, service programs and other types of systems software. It primarily increases the labor productivity of programmers almost tenfold and also the use of expensive equipment 1.5-2-fold.

The development of collective-use computer centers (VTsKP) raises the significance of systems software to a qualitatively new level. This is determined primarily by the essentially new conditions for use of computers in VTsKP, the considerable expansion of the nomenclature of hardware and equipment for combining it into a unified technical complex. Moreover, a sharp increase in the number of diverse users accordingly expands the range of problems being solved and mainly makes it necessary to concentrate an enormous amount of applied information in the VTsKP, the content and operation of which becomes a difficult task. It is simply impossible to solve the indicated problems without systems software.

Experience in development and use of systems software for the computer facilities of the YeS EVM [Unified computer system], which comprise the technical basis of the VTsKP, has now been accumulated by the system of the USSR TsSU [Central Statistical Administration]. Experimental collective-use computer centers have already been created in the system of the USSR TsSU (at Tula, Tomsk and Tallin). Some results can now be summarized and methods can now be noted for development of systems software used in collective-use computer centers.

Let us first touch on some aspects of applied software, which has a significant effect on the methodology of systems software. Collective-use computer centers have accumulated applied software in the amount of approximately 4.5 million machine instructions. Among them are 520 programs and 1.8 million instructions for the Tallin VTsKP, 470 programs and 1.5 million instructions for the Tomsk VTsKP and 450 programs and 1.2 million instructions for the Tula VTsKP. The total number of programs comprises approximately 1,500 and the average volume of separate programs comprises a little more than 3,000 Assembler language operators in the same units of measurement. The applied programs for the VTsKP are designed to solve accounting and economic problems of the users of different institutions and agencies. Applied software was developed to solve the problems of users by means of operating systems of type DOS [Disk operating system] and OS YeS [Operating system of the unified system]. PL-1, in some cases Cobol and very rarely systems and problem-oriented applied program packs (PPP) were selected as the main programming language.

The status of the applied software of the VTsKP is now characterized by the following features: a large number and diversity of programs which pose the problem of controlling them in a new manner and namely the standard capabilities of operating systems (and there are more than two of them) are clearly inadequate to perform these functions; therefore, practice advances the tasks of controlling the calculating process by nonstandard equipment, duplication of programs to solve problems of the same class, mainly due to insufficient information content of developers on the operations of each other, difficulty and in most cases the impossibility of transferring applied programs from one VTsKP to another although they are supplied with equipment of the same type (YeS-1033), the diversity of program-solving techniques, which leads to an increase of the fraction of human labor and reduces the efficiency of computer use, the low percentage of using systems program packs in applied software, including universal systems of controlling data bases, and concentration of large volumes of specific information in VTsKP archives, the owners of which are various users. This places a new status on the problem of data exploitation.

As already noted, we selected only those aspects of applied software for analysis which either affect systems software or are directly dependent on it.

The enumerated problems, which characterize the state of applied software at present, although they cannot claim to be an exhaustive analysis of it, serve as the orientation point for analysis and determination of the main trends in development of the systems software (SPO) of VTsKP.

What of the problems solved by the SPO in modern computer technology? On the one hand, SPO performs functions of enhancing the "intellectual capacity" of computers by automation of a large number of processes arising in solution of applied problems, standardization of many elements of program design, including debugging, and so on. And on the other hand it provides high efficiency in the use of expensive equipment by multiprogram operation in different modes: batch processing, time-sharing and so on. However, the multiprogramming mode is clearly undesirable for a program taken separately since it requires some additional efforts during programming and at the same time reduces the speed of solving the problem. Efficient use of equipment as a whole is provided only in the multiprogram mode, organization of which permits one to increase the integral capacity of computers.

The VTsKP accomplishes a new form of using computer equipment. The systems software used at the VTsKP is designed to solve the same problems as the SPO for individual computers and at the same time it advances to the forefront those properties which are seemingly in the background under conditions of individual use.

Let us consider the mentioned properties from aspects of the role of the SPO which was already mentioned. An increase in the level of the "intellectual capacity" of VTsKP hardware is provided primarily by facilities of the operating systems of YeS EVM, which make available to the user an adequate number of high-level algorithmic languages and corresponding compiler programming systems (Assembler, Fortran, Cobol, RPG [Report Program Generator] and PL-1). Operating systems contain the required program complexes for program editing and debugging and for performing many standard functions of preparation and operation of information files (EDITOR, DEBUGGER, SORTING, UTILITIES and so on).

Functions of data exchange among the central computer, peripheral equipment and user points are provided by standard methods of access. They include basic (sequential, index-sequential and so on) and telecommunications (basic and general) access methods. The operating systems are represented by specific generated versions of OS 4.1 and DOS 2.3. The systems program packs additionally developed and used under VTsKP conditions play an important role in expansion of the named functions. To expand and improve the calculating capabilities of computers, the program stocks of the VTsKP are supplied with specialized program packs which permit one to solve problems of linear algebra, mathematical equations and modelling.

The capabilities of programming developments and management of symbolic program libraries are being improved significantly and expanded by means of systems program packs. These systems packs include the "UYeS" [expansion unknown] used extensively by programmers. The use of PPP increases the number of methods of access which expand the functions of operating systems. This class of PPP includes packs of type KAMA, ROS, SPO-397 and especially OKA. However, it should be noted that universal PPP perform the same dual, contradictory functions, i.e., on the one hand they increase the service of operating systems in providing the user with the required methods of access and on the other hand they perform the functions of organizer of new or modifications of old computer operating modes.

Let us dwell on their main function--expansion of the capabilities of methods of access. It should first be emphasized that all the indicated packs have found application to one or another extent in the SPO of the VTsKP of Tallin, Tomsk and Tula.

The "KAMA" PPP expands the methods of access of OS YeS in two directions. First, the basic methods of access (direct and index-sequential) are supplemented by a facility such as indirect addressing of data blocks in the VZU [External storage], which considerably facilitates programming of hierarchical ratios of data. Second, an interesting method of access has been developed which is somewhat similar to the general telecommunications method of access (OTMD) of the OS YeS, but also differs somewhat from it. Specifically, the "KAMA" permits one to start a program from the terminal in the standard fashion. Moreover, the "KAMA" makes available a number of other service functions of program, memory, time and other types of control. Essentially, the "KAMA" PPP can be regarded as a new operating (calculating) medium created above the OS YeS medium. We feel that this is its greatest disadvantage. The argument according to which the calculating medium of "KAMA" does not prohibit the use of the operating medium of the OS YeS is weak since the use of the telecommunications access of the pack essentially denotes a detour of the OS YeS medium. The indicated reason, we feel, does not permit one to recommend the "KAMA" PPP for extensive use in VTsKP. A similar pattern also occurs in use of the "ROS" PPP, designed mainly to provide a high level of automation of data exchange control between different computers. Methods of pack access can be divided into two groups: 1) intermachine--for data exchange of four computers locally concentrated in a single location and 2) telecommunication--for data exchange between computers located at a distance from each other.

In what way is the variation of the calculating medium in VTsKP undesirable? First, generation of each new calculating medium requires the use of considerable equipment resources, the main indicator of which is the internal storage capacity occupied by the control program of the pack. The mean value of this indicator for all the mentioned PPP is equal to 100 Kbytes. Second, the use of different operating media in the unified hardware of VTsKP does not always permit one to transfer applied programs from one center to another without the corresponding modifications, i.e., a type of violation of the main principle--program compatibility--occurs.

It is better in this regard to be concerned with the use of the SPO-397 as an "expander" of the telecommuniations methods of access to the OS YeS, which provides with minimum facilities the possibility of processing by applied programs the information introduced through communications channels under conditions of a user network. No significant variation of the calculating medium is observed in this case; therefore, the SPO-397 has also found application in the VTsKP of Tallin and Tula. However, the problem of its extensive use in the SPO of VTsKP still requires careful investigation since specialized agreements on communications protocols are used in the SPO-397 system and the possibility of elements of a new calculating medium appearing is not excluded.

Data base control systems have the most significant effect on the "intellectual capacity" of hardware. And it is difficult to overestimate their significance in VTsKP. One can state in this case that the use of data base control systems (SUBD) in systems software is a necessary condition for high efficiency of a new form of introduction of computer equipment. Therefore, let us dwell in more detail on the posed problem.

It is known that modern SUBD permit one to solve those problems in data processing which are impossible when using ordinary (file) data control systems contained in operating systems. This is achieved by high level of data integration provided by the SUBD, which permits accumulation and concentration of a large amoung of information in the VTsKP on a large scale, the considerable independence of applied programs of the structure and composition of data, which makes the processing systems based on VTsKP more stable and mobile with respect to the changes occurring in the structure of the informationbeing proc essed, provision of the integrity and protection of information by SUBD facilities and reduction of the laboriousness in development of applied programs which operate with data bases, which permits a reduction of expenditures for programming in VTsKP.

More than 30 data base control systems have now been developed in the USSR. Moreover, they all, with rare exceptions, are usually incompatible with each other and part of them are specialized in nature (SIOD-1 and SIOD-2). Let us briefly outline the concept which we feel is more acceptable in VTsKP. Let us note first that standard design solutions are most effective for mass use. Besides specialized systems, SUBD are oriented toward use of DOS and OS YeS, respectively, in the medium. The orientation of VTsKP SPO toward the OS YeS medium is obvious; therefore, let us exclude all SUBD systems for DOS YeS from analysis. Final selection must be made from SUBD systems developed for the OS YeS. The selection criterion--the degree of universality of the SUBD which in turn characterizes the level of problem-solving of data processing systems, which was already indicated--is the most significant for VTsKP.

Among operating SUBD, preference should be given to the OKA system, which now permits one to use remote processing and will be supplemented in the near future by good service. A significant disadvantage of the OKA system is that its basis is the hierarchical model of data, which in turn generates a number of negative properties of the SUBD: some inertia of the system in servicing a number of requests and inconvenience in use of operations of data transport to the base. These disadvantages occur with regard to the hierarchical system of relationships among data and are inherent to the very nature of "OKA" SUBD itself. Other types of SUBD also merit attention and careful analysis and we feel can be regarded as supplements to selected standard solutions.

The problem of increasing the equipment utilization factor is solved by SPO facilities through automation of a number of auxiliary operations in control of the calculating process and realization of effective operating modes of computers in VTsKP. Operating systems are unable to solve all problems of effective organization of operations in a standard manner within VTsKP. Therefore, the use of the PPP series which expand the functions of the OS yield good results in some cases. Among the packs should be noted the "KROS," "ROS" and SPO-397 PPP.

Planning of tasks is improved, the work of the operator is simplified and the efficiency of hardware utilization is increased by means of "KROS" PPP. Similar functions, only applicable to multimachine configuration of VTsKP hardware, are performed by the "ROS" PPP. It should be noted that a number of the enumerated functions of the mentioned packs is standard in the most similar versions of the operating system, specifically in the OS 6.1.

The problem of organizing the functioning of the VTsKP user network is more complex. Three trends in solution of this problem--use of the SPO-397 system, development of a VTsKP dispatcher and the use of the OS YeS time-sharing system (SRV)--occur at the given stage of development of SPO.

Final selection of the standard solution should apparently be made from the results of experimental operation of VTsKP SPO. Let us consider some concepts in this regard.

We feel that the standard solution should meet the following requirements: maximum efficiency in servicing of the user network expressed in minimization of the reaction time of the system and minimization of the internal storage resources required for this, obligatory joining and joint operation with standard SUBD used, adaptability to changes of communications protocols and switching modes (messages, packs and channels) and the capability of use within the VTsKP network, organization of which will be the next significant step in development of the given direction.

Not one actually operating system yet meets all the requirements. A system with time sharing of the OS YeS and also the VTsKP dispatcher under development in which the enumerated requirements should be realized are most promising in this regard.

But such circumstances as the incompletion of developments of the VTsKP dispatcher and the shortage of internal storage resources of VTsKP hardware for extensive use of a time-sharing system (an SRV requires a computer with capacity of not less than 750 K) also stand in the path of complete solution of the indicated problem. Moreover, an SRV cannot fully satisfy requirements of intermachine exchange and data base control equipment.

For these reasons the SPO problems considered here require serious analysis and corresponding developments.

Orientation of the VTsKP to data processing under existing conditions of the subscriber network, we feel, cannot be recognized as fully satisfactory. Specifically, failure even for a short time of calculating capacities concentrated at one location results in interruption of the problem-solving schedule, which is quite impermissible in some cases. The content of significant reserve calculating capacities within an individual VTsKP is too expensive. It would be more feasible to be able to obtain the necessary reserve calculating capacities in a network of multiple-use computer centers.

This mode of VTsKP hardware use is now not being supported by the corresponding systems software and requires further developments.

With regard to the foregoing, one can enumerate the major trends in development of systems software for the near future.

1. Conversion of all VTsKP for use of an operating system of a single class of OS YeS, which rejects the use of a system of type DOS YeS, should now be completed.

2. Standardization of the calculating medium should be completed by unification of the composition and functions of systems software, having rejected the use of a number of packs not oriented toward application in VTsKP (for example, "KAMA" and "ROS") and also having completed development of a universal dispatcher of VTsKP.

3. Convert to modern methods of information integration by creation of data banks with very large volume and to the use of corresesonding SUBD.

4. Increase the level of algorithmic programming languages and standardize data processing techniques, relying on modern automated data banks integrated with remote processing systems.

5. Realize the mode of the VTsKP network, having provided in it operational redistribution of resources and methods of integration of calculating capacities and external storage.

6. Develop and use the time-sharing mode of calculating capacities to solve complex territorially distributed problems on the basis of a model of a computer collective.

7. Increase the level of the "intellectual capacity" of terminals supplied with calculating capacities.

Coordination and centralization of work in the given field is required to solve the indicated problems.

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REQUEST FOR COMPUTER COMPATIBLE ORDER FORMS IGNORED

Moscow EKONOMICHESKAYA GAZETA in Russian No 12, Mar 80 p 12

[Letter from L. Bryukhina, economist in shop no. 3 of the Volgograd Steel Wire-Rope Plant, and V. Fedosova, chief engineer in the plant's information and computing center]

[Text] An automated control system has been operating for several years now in our plant. Some 70 tasks are handled by the computer. The input data for the majority of them are based on supply orders from the Soyuzglavmetallosnabsbyt [Main Administration for Supply and Marketing of Metal Products, USSR State Committee for Supply of Materials and Equipment]. Upon their receipt in the plant, plans for the production and sale of products are calculated, the quarterly production programs of the basic shops are formulated, and the production cost of products from the steel wire shops is planned. Dozens of tasks are handled that economists previously had to spend a good deal of working time on.

It would seem that everything is fine, but the amount of time spent on performing calculations could be considerably less. Here is why. The supply orders coming in to us have not been adapted to machine processing; not one parameter in them has been coded. Therefore, before the supply orders are sent for machine processing, all the parameters have to be coded and the orders copied on forms developed by plant specialists. It takes several to make up the duplicates everyday. We know that the same situation exists in other enterprises too. As a result, the duplicates differ in form and codes.

Time and again the plant's directors have asked Soyuzglavmetallosnabsbyt to standardize supply orders for the enterprises in a format compatible with machine processing, but nothing has been done.
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CSO: 1863

BANK ACCOUNTING SOFTWARE, HARDWARE SYSTEM DESCRIBED

Moscow DEN'GI I KREDIT in Russian No 6, 1980 p 47

[Article by N. S. Shuvayev, candidate of economic sciences: "Processing Accounting Data"]

[Excerpt] Since 1977, the "Daily Bank Operations Accounting" task has also been handled on the M5000 (M5010) PVK (peforated media computer complex). This task development project was done by the computing center of the Voronezhskaya oblast office of the USSR Stroybank [All-Union Bank for the Financing of Capital Investments] and approved by the director of the Stroybank as a standard. Since then, the project has found wide application mainly in those bank institutions using computer installations of the USSR TsSU [Central Statistical Administration] which have the M5000 PVK.

Despite the relatively small memory, 32K bytes, of the M5000 (M5010) PVK and the computation rate, 1,000 operations per second, this machine has a number of advantages, including direct access storage on the R412 and R421 magentic disks and a well-developed software system.

Accounting and operations information, reflecting the daily result of the financing, credit and economic activity of organizations, clients of the bank, makes up a considerable portion of the total information handled by the USSR Stroybank's institutions. Applying the M5000 PVK has made it possible to exploit past experience gained in processing banking information and to further develop the technology of machine processing of accounting data.

The system as developed by the Voronezhskaya oblast office can be used with either centralized or decentralized accounting. The software makes it possible to process information relatively quickly. Thus, only one hour of machine time is needed to process 1,000 payment documents.

The M5000 PVK software system for "Daily Bank Operations Accounting" includes main and utility programs. The main programs process the payment documents and output reports; auxiliary programs create and update files, transfer data from one machine medium to another, and verify, sort and print data. All of the programs are written in ASSEMBLER and compiled under the disk operating system (M5000 DOS), i.e., the programs operate under the control of the standard disk operating system of the M5000 (M5010) PVK.

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ORGANIZATION AND PROCEDURE FOR DEVELOPMENT OF FIVE-YEAR AND ANNUAL PLANS FOR COMPUTER CENTERS

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 6, 1980 pp 105-107

[Article by B. Andreyev, A. Merkulov, and V. Smirtyukov]

[Excerpts] To further improve planning, the procedures for the economic activity of computer centers (VTs) and networks of them (SVTs) now have to be refined and modified, similar to the practice in science and production (in institutes and enterprises).

Among the factors facilitating improvement in planning are planning the centers' work for the five-year plan and compiling the financial and production plan for each year. This provides the prerequisites for cooperation and centralization of center operations, rational use of allocated resources, methodological program compatibility, and the opportunity to increase the load on center computers and equipment.

Center technical and methodologically instructive documentation associated with developing mathematical and economic models, algorithms and programs for solving information processing problems, various instructions, classifiers of documentation, the information base, etc. are developed in a manner similar to that used in NII [scientific research institutes] and KB [design bureaus].

In planning center computer and equipment loads, repairs and preventive maintenance, production principles for planning the load on a pool of machines and equipment are applied. Therefore, center and network operations are reflected both in cost (thousands of rubles) and natural indicators (man-days), used in the NII and KB, and in machine-hours which is characteristic for production. These indicators provide the opportunity for defining the amount of work being done by the computer centers in current plans (for the year with quarterly breakdowns, for the quarter with monthly breakdowns) and in five-year plans by years.

Plans for the five-year plan, by years, and the annual financial and production plans (PFP), which expand and add detail to the five-year plan, for the centers are the basic planning documents defining the major directions of development and economic production activity of the centers in accordance with the state plan for the economic and social development of the country.

The indicators of the five-year plan and the PFP for the centers are submitted on form 36-P (five-year plan) and 36-VTs (the PFP) to the appropriate oblast (kray) plan commission, the state plan committee of the autonomous and the union republic or to the union republic (without the oblast division) to be used in compiling the consolidated indicators of the overall development of the economy, and in developing balance accounts of labor resources, personal income and expenditures, trade turnover, residential and municipal construction and other plan indicators.

The USSR and union republic ministries and departments put the standard forms into concrete form and supplement them with accounting indicators applicable to the specific nature of the given ministry (department) of the region. To ensure comparability of the indicators and the capability of mechanization and automation of accounting, planning and calculating work, uniform copies of divisions and codes of the standard forms should be adhered to in developing specialized methods.

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WORKING OUT THE POLITICAL AND ECONOMIC PROBLEMS OF THE STATE AUTOMATED MANAGEMENT SYSTEM

Moscow EKONOMICHESKIYE NAUKI in Russian No 8, 1980 pp 117-118

[Article by V. Kuznetsov, docent and candidate of economic sciences, and V. Bondarev]

[Text] The use of electronic computers and economic and mathematical methods and models in automated management systems is of major importance in the complex of measures to improve management of socialist production.

Creating the State Automated Management System (OGAS), provided for by the 24th and 25th CPSU congresses, is becoming to an ever greater degree a decisive course in improving management of the national economy and in displaying the organic connection between the contemporary scientific and technical revolution and the advantages of socialism. OGAS, notes academician V. M. Glushkov, "will make it possible to the full extent to disclose and make use of the enormous advantages of our social system, ensure further progress in increasing the economic and defensive might of our homeland, and promote a further rise in the prestige of the ideas of socialism."[1] As noted in the press, the OGAS project is among the greatest projects of our day, and its value to the country is comparable to the value of the plan for the GOELRO [State Commission for the Electrification of Russia, 1920].[2]

The ever increasing use of modern technology in the processes of management and the creation of OGAS on this physical basis are shaping the transition of the management of the national economy to a qualitatively new level. This requires from science a more profound elaboration of the methodological principles for establishing the OGAS, above all from the positions of

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1. Glushkov, V. M. "Avtomatizirovannyye sistemy upravleniya segodnya i zavtra" [Automated Management Systems Today and Tomorrow], Moscow, 1976, p 63.

2. See: Fedorenko, N., "Tools for Optimization of Plan Decisions," KOMMUNIST, No 16, 1978, p 32.

Marxist-Leninist political economy. A substantial contribution to working out the problems of OGAS should also be made by the higher school which concentrates the main share of the country's political economy specialists.

In 1976, on academician V. M. Glushkov's initiative, the department of political economy of the Moscow Aviation Institute imeni S. Ordzhonikidze (MAI) was enlisted in the effort in progress by the All-Union Scientific Research Institute of Problems of Organization and Management (VNIIPOU) to work out the political and economic principles of OGAS. Yu. A. Komarnitskiy, department head and doctor of economic sciences, led the group of instructors, organized in the department, to study the problems of OGAS. The studies underway in this direction have considerably stimulated and deepened the scientific work in the department.

A large role in working out the political and economic principles of OGAS is played by the scientific seminars held regularly with broad participation by instructors from both institutes. They have made it possible to provide a fruitful exchange of ideas and have promoted a deepened understanding of the problems of OGAS and the elaboration of its overall concept. A substantial contribution to this effort is being made by Yu. A. Mikheyev, deputy director of the VNIIPOU and doctor of technical sciences, and section chiefs, V. G. Lisitsyn, candidate of technical sciences, and A. S. Florov, candidate of physical and mathematical sciences.

Concrete results of the joint scientific activity were reflected in the scientific research reports presented to the Academic Council of the VNIIPOU: "Methodological Principles of the Political and Economic Substantiation of OGAS" (1977), "Analysis of the Effect of the Economic Laws of Developed Socialism as a System Applicable to Its Utilization in Managing the National Economy under the Conditions of OGAS" (1978), and "Study of the Economic Categories of Developed Socialism Applicable to Improvment of Intersectorial Management under the Conditions of OGAS" (1979).

In 1978, the VNIIPOU jointly with the department issued the report "Political-Economic Grounds for Establishment of OGAS." It formed the basis for working out the corresponding section of the normative document "Basic Provisions of OGAS," issued by the VNIIPOU in 1979 within the framework of efforts made to set up the OGAS. Study results were also presented at the intersectorial exposition "Management-79"; shown in particular were the objective prerequisites and basic directions of the social and economic effect from creating the OGAS. In February 1980, within the framework of an all-union seminar on the OGAS, the department organized jointly with the VNIIPOU a section on the social and economic problems of establishing the State Automated Management System.

A considerable rise in the level of working out the political and economic problems of the OGAS will be promoted on the one hand by drawing in an even greater number of VUZ associates for studies, and on the other, by providing for clearer coordination and more purposeful direction of these efforts.

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COMPUTER TECHNOLOGY IN MANAGING THE OBLAST ECONOMY

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 8, 1980 pp 66-72

[Article by A. Mekhrentsev, chairman of the Sverdlovskaya Oblast Executive Committee and Hero of Socialist Labor]

[Text] It is well known that as a major industrial center, Sverdlovskaya Oblast has a high level of concentration of industrial production and a large share of the employment of the population. The central Urals is an area of highly developed mining and metallurgical industry; heavy, power and chemical machine building and metal working; timber and woodworking industry and construction industry.

More than 3,000 industrial, transportation and communications enterprises are concentrated in the cities and workers' settlements. Although only six percent of the working population is engaged in agriculture, the oblast produces agricultural products valued at 1 billion rubles.

Substantial growth in production volume has led in recent years to complication of the links between sectors of industry, industrial enterprises and all elements of the economy, which has caused a sharp increase in the demands on the system of planning and management. A major role in it is being allocated to questions of application of computer technology.

Active efforts to introduce computer technology, as in other regions of the country, began back in the Eighth Five-Year Plan. And by the start of 1980, 133 computer centers were operating and serving more than 420 enterprises and organizations. More than 50 automated mamangement systems are operating within the oblast. The economic effect from the use of computers is defined in tens of millions of rubles.

In the 10th Five-Year Plan, computer technology has begun to be employed in a number of oblast organizations and in the departments and administrations of the oblast executive committee. For example, the Central Urals Territorial Automobile Transportation Administration has a multiple-user computing center and its branches in various areas of the oblast: in the cities of Asbest, Krasnotur'insk, Kamyshlov, Bogdanovich, Irbit, Kamensk-Ural'skiy and Revda.

The automated system embraces eight subsystems and handles about 100 tasks, including major program complex tasks: "Expeditious Planning of the Transporting Process," on the basis of which are compiled the daily shift assignments for drivers to haul freight; "Summary," which daily puts out expeditious information on the operation of all automobile transportation enterprises to the chief of the Central Urals Territorial Transportation Administration; "Statistical Accounting," which makes it possible to concentrate data processing for 33 automobile transportation enterprises, etc.

An automated system for dispatch control of buses has been introduced at the multiple-user computing center, which makes it possible for the central dispatch service to expeditiously control the movement of buses in Sverdlovsk.

Calculation of the transportation balance for freight hauling has been worked out and is being handled by the normative method. The aim of this task is to achieve the highest correlation between the demand for freight transportation and the needed quantity of rolling stock, irrespective of its departmental afiliation for the planned period.

A major enterprise in the information industry is the Computer and Management Center for Oblast Management of Municipal Services that maintains the territorial-sectorial system of managing the housing and municipal services for the oblast. The first phase of the ASU [automated management system] combines the subsystems: plan calculations, processing of accounting and statistical information, supply of materials and equipment, operational control and repair service. Being implemented for industrial operation are automated systems for control of industrial processes: ASUsverdvodoprovod [Sverdlovsk water supply system], ASUsverdelektprotransport [Sverdlovsk electrical industrial transportation system], ASUgostinitsy [hotel] and ASUgaz [gas system]. Under development at the center are large complexes of tasks covering 150 items, including settling with apartment tenants for utilities in a single ledger, internal city registration and exchange of living space, etc.

Many other computing centers are operating very effectively too; however, they are operating autonomously. In the best case, they have ties to their sectorial superior and subordinate levels of management, i.e., "vertically." Unfortuantely, in the stages preceding introduction of computers, inadequate attention was paid to automation of intersectorial considerations; therefore, the forms and methods of activity of the computer centers were developed spontaneously at times. The sectorial computing center was not given the clear task of submitting information needed to organize territorial planning to the oblast level in addition to implementing intrasectorial considerations.

An abnormal situation exists when with a large number of computer centers and a high-capacity modern pool of computers, there is a complete lack of informational ties between sectorial and territorial automated elements of the system to manage the oblast economy, and almost all elements do not furnish information for the immediate work of the oblast plan.

It seems that if rational interaction between the automated systems of a different level were organized, the possibility of more efficient management of the development of the economy in the oblast would arise.

In our view, this aim could be achieved in several stages.

In 1976, in accordance with a decree of the USSR State Committee on Science and Technology, development of the ASU of Sverdlovskaya Oblast (ASU-SO), which is the territorial link in the ASU of Russia, began on an experimental basis.

Operating fruitfully in Sverdlovsk is the planning and design organization Sverdlovskoye PKB ASU, which was given the task of implementing the first phase of the ASU of Sverdlovskaya Oblast. It should be mentioned that the project documentation was completed in a skilled manner and on time, and that the tasks of the first phase are now being introduced.

The ASU of Sverdlovskaya Oblast was built on a hierarchical structure. The oblast, city and rayon levels of management have been selected in it.

Under development in the first phase for the oblast level are the ASU for the oblast executive committee and the automated system of plan calculations (ASPR) for the Sverdlovskaya Oblast Planning Commission.

The ASU for the oblast executive committee consists of three subsystems: "Monitoring of Executive Discipline," "Personnel Management," and "Information-Reference Service of Directive Agencies."

The subsystem "Monitoring of Executive Discipline" automates such important functions of monitoring of workers of the apparatus of management as execution of directive materials, timely and proper consideration of workers' complaints and suggestions, execution of mandates of electors, as well as the function of accounting and analysis of execution of decisions of sessions and executive committees of local councils.

All monitored documents of a number of past years and the current year have now been stored in a computer.

Test operation of the task "Monitoring of Execution of Directive Materials" has shown that since its introduction, the volume of monitored documents has been increasing, completeness and accuracy of monitoring has been provided for, and shortcomings in the work with documents have been detected; notification of the director of organization-executive and directors of the oblast executive committee on documents not executed on time is being made more quickly and the publicity of execution has been enhanced. At the same time, the information being stored in the computer is an objective description of the efficiency of individual executives. Active operation of the task is having the effect of raising the responsibility of the executives for accomplishing the measures entrusted to them. It is true that the information itself on the course of execution of particular documents and decisions still does not ensure complete realization of them, but it creates essential prerequisites for more efficient monitoring of the decisions made.

Considering the multisectorial nature of the economy and the large scale of industrial production in Sverdlovskaya Oblast, the oblast executive committee and the oblast planning commission have considered it necessary to focus attention in the effort to create the first phase of the ASU of Sverdlovskaya Oblast on the development and introduction of an automated system of plan calculations (ASPR) for the Sverdlovskaya Oblast Planning Commission. The development and introduction of the system for plan calculations are creating the conditions for radical enhancement of the level of plan work for the oblast economy.

Making up the first phase of the automated system of plan calculations for the oblast planning commission are the following complexes of tasks:

formation of the consolidated plan for economic and social development of the oblast;

planning, accounting and analysis of meeting the basic indicators of productive activity of a number of sectors, within the jurisdiction of the local councils, including consumer services, trade and public catering, and local industry;

planning and management of agricultural production;

management of capital construction;

and management of labor resources.

In automating the process of compiling the consolidated plan for economic and social development of the oblast, we are taking advantage of the experience of the Chelyabinskaya Oblast Planning Commission. The draft of the plan for economic and social development of the oblast for 1980 was formulated with the aid of a computer. With the introduction of this complex of tasks, the basis was laid for the information base of a system containing local plan indicators for more than 800 leading enterprises and organizations in various sectors and departments located in the oblast. This information base makes it possible to organize in the future a broad range of calculations of the need for various types of material and labor resources. We consider this complex a pilot, inasmuch as its information links will make it possible to create ramified groups of tasks of plan calculations.

As for automation of sector plans, in 1979, a plan was successfully formulated for consumer services for all types of services, for all enterprises and organizations in the oblast in various profiles, including by cities and rayons. And the plan was compiled and distributed many days earlier than in previous years when it had been formulated manually.

Within the ASU of Sverdlovskaya Oblast it is intended to create a high-level complex of tasks for planning and management of agricultural production. To start with, included in it were tasks for optimal allocation of the plan for purchases of agricultural crops by cities and rayons and forecasting the yield of agricultural crops. It is now planned to shift to the development and introduction of tasks for programming the harvest, as well as planning the optimal structure of the machine-tractor pool by rayons and farms as a function of the model of the harvest process. Now being processed on a computer are the multifactor functions being derived as a result of the agronomic experiments being conducted at the "Borodulinskiy" State Farm where grain harvests have been over 40 ts/ga [centners/hectare] for a number of years. The results of these calculations will be used to adjust the technique of conducting the agronomic experiments being conducted at other farms in the oblast that are introducing this method. Accumulation of statistical data will make it possible in the near future to plan agrotechnology to receive a given yield.

In the stage of creating the first phase, the subsystem for management of capital construction has been most fully well-planned in coverage of the functions of planning and accounting. This is extremely important for Sverdlovskaya Oblast in view of the large volume of capital investment assimilated annually.

It is planned to put into computer storage, by project, orders for construction of all facilities that it is necessary to build in the oblast in the next plan period. Using a multifactor system of evaluation of importance, the computer should formulate a list of projects that it is advisable to include in the title list taking into account a given amount of capital investment.

The list of projects compiled by the computer is refined by workers in the oblast planning commission and evaluated in the load of capacities of subcontracting organizations in the profile of cities and rayons in the oblast. The joint effort of man and computer produces a considerably more substantiated plan for capital construction and title list of projects. The presence of the title list in computer storage makes it possible to organize accounting and monitoring of its accomplishment, as well as to obtain various analytic information and on the basis of it to raise the effectiveness of capital investment.

The title lists for projects of local councils for the 1979 and 1980 plans were formulated with a computer. And for the first time, the title lists for the 1980 plan were produced and distributed within 10 days after the decision of the session of the oblast council, even before the beginning of the year being planned. Operation of the tasks of accounting of completion of the capital construction plan is done for the month, quarter and year. Introduction of the ASU-SO has made it possible to begin in the first quarter of 1980 to balance construction organization capacity with the amount of construction-assembly work for all oblast projects at the stage of formation of the draft capital construction plan of the 11th Five-Year Plan. Orders for construction of several thousands of facilities for industrial and nonindustrial purposes for more than 500 leading enterprises and organizations in the oblast have been put into computer storage. Accomplishment of such a balance manually (as was attempted earlier) and calculations on the rational load on the construction organization capacity taking into account their distribution by cities and rayons in the oblast could not be done practically in view of the extreme complexity. Using a computer enables solving this problem.

Within the first phase of the ASPR, the subsystem for management of labor resources is represented as a group of tasks of demographic calculations and tasks of specialized employment of the population. Unfortunately, the project does not yet include the task of balancing labor resources. In the 11th Five-Year Plan, however, we intend to use a computer to organize monitoring the number of workers by enterprises, cities and rayons in the oblast, to implement systematic analysis of the shift of the labor force, and to work out substantiated balances of labor resources in conformity with the oblast plan for economic and social development. And for now as preparation for realization of this program on a computer, a consolidated estimate has been made of the need for 1980 for new specialists of all specialties for all oblast enterprises and organizations. In formulating the 1980 plan for economic and social development in the oblast, 11 of its 14 volumes were formulated and printed with computer assistance.

The ASU for the city and rayon level are being developed simultaneously with the upper level of the ASU of Sverdlovskaya Oblast. We realize very well that this is a very complicated and labor-intensive effort and that it is not possible to formulate numerous links of the territorial system right away. Up to now, work on the ASU of Sverdlovsk has been in the direction of automating management of the various elements of housing and municipal services, transportation, trade and communications (the ASU for municipal and housing services, the ASU for the water system, the ASU for electric transport, etc.). A system for management of labor resources is under development in Nizhniy Tagil. The subsystem for monitoring executive discipline is being introduced in the executive committees of Sverdlovsk and a number of other cities. The ASU of the Leninskiy Rayon of Sverdlovsk is in the introduction stage; it has six subsystems: monitoring of executive discipline, direction of economic construction, direction of ideological work, plan calculations, direction of consumer services, and accounting.

The experience of introducing the ASU of the Leninskiy Rayon will make it possible to later disseminate this development to all Sverdlovsk rayons.

A wide range of organizations are involved in developing the ASU of Sverdlovskaya Oblast; among them are the Institute of Economics of the Ural'skiy Scientific Center, the Sverdlovskiy Legal Institute, the Ural'skiy Polytechnical Institute and others.

A coordinating council and council of main designers that unite the leading workers of the oblast party and council organizations, managers of the departments and administrations of the oblast executive committee, scientists, specialists and leaders of computer centers have been set up in the oblast. At the sessions of the coordinating council are discussed the basic fundamental questions of building the ASU-SO and the organization of work on its development.

In 1978, a department for the ASU was created under the oblast planning commission to carry out the work on introducing the first phase of the ASU of the Sverdlovskaya Oblast. In that same year, the first stage of creating the material-technical base for the system of management of the upper level began to be implemented; a YeS-1033 computer was acquired, subdivisions were set up to implement and operate the organizational and informational supply and software and hardware of the first phase of the ASU-SO, and formation of the oblast data transmission network was begun.

Simultaneously with setting up the nucleus of the future computer center for collective use of the Sverdlovskaya Oblast Executive Committee, a start was made on organizing the oblast data transmission network with 50 baud teletypes that the oblast office of communications began to install at the city rayon executive committees.

At the start of 1980, we began implementing the second stage—creating the computer center for collective use (VTsKP) of the Sverdlovskaya Oblast executive committee.

In the first period of existence of the VTsKP, it is planned to equip it with a complex of two YeS-1033 computers, video terminals and equipment for remote data processing.

This will make it possible to organize reliable performance of the tasks and operation of the subsystems of the first phase of the ASU of Sverdlovskaya Oblast not only in the batch mode, but also in the real-time mode; to ensure development of an extensive information base for the automated system of plan calculations of the Sverdlovskaya Oblast Planning Commission; to create a reserve of computing capacity for development of the new tasks of the second phase; and to offer surpluses of computing capacity to various users in the enterprises and organizations under the jurisdiction of the Sverdlovskaya Oblast Executive Committee.

In Sverdlovsk, construction of a special building for the computer center for collective use has begun. When it is put into operation, the next stage of creating the material-technical base for the ASU of the Sverdlovskaya Oblast will begin. The computing center of the oblast executive committee will be transformed into a large-capacity territorial VTsKP, equipped with a multimachine computing system.

Establishment of this center will make it possible to implement reliable operation of the second phase of the ASU-SO and will provide processing of information for a wide range of enterprises and organizations in Sverdlovsk and the oblast. In addition to setting up the territorial VTsKP, in 1983 it is planned to organize a city network of computers too. In addition to the territorial VTsKP, the city computer network will include computing centers of organizations under the jurisdiction of the oblast executive committee as well as those of major industrial enterprises.

The city computer network will have an outlet to the computer network of the Ural'skiy Scientific Center.

According to tentative calculations, about 60 organizations and enterprises will become subscribers to the collective-use computing center during the early years of its operation.

Those who will be operating with the collective-use center include the oblast committee of the CPSU and the oblast executive committee, the oblast planning commission, more than 20 departments and administrations of the oblast executive committee, a substantial group of scientific research institutes and planning and design bureaus in Sverdlovsk, and industrial enterprises in the city and oblast.

The establishment of the collective-use computing center with the city computer network will make it possible to handle not only the broad range of tasks of plan calculations, but also the tasks of: intrasectorial management (for departments and administrations of the oblast executive committee); management of the technical preparation of production, technical and economic planning, accounting and reporting; management of the supply of materials and equipment, sales and others for individual enterprises of local, republic and all-union industry, in which it is not expedient to set up autonomous computing centers. The intended integration of computer hardware will help create the technical prerequisites for forming an extensive information base for common use in the territorial automated management system; engineering-technical and technical-economic calculations associated with conducting scientific research and design developments for VUZ's, scientific research institutes and planning and design bureaus.

The concentration of material and labor resources at the computing center should provide a cheaper form of information processing and one that is more advantageous for the user. What is meant here is that first of all there will be organized multiprogramming work of users in the time-sharing mode with the computing system. In the first stage, the collective-use computing center building will contain a group of subscriber rooms; each room will be equipped with video terminals, plotters and wide printers as well as data transmission equipment. A high-capacity shop for duplication of documentation should be set up at the computing center. A user, occupying a subscriber room by schedule, will be able to work one on one with the computer and obtain the results of his work in the form designed. In the subsequent stages of development of remote processing, the subscriber stations will be moved to the organizations and enterprises of the users. This form of collective use of computer equipment, in our opinion, should provide considerable enhancement of the efficiency of using the available computer equipment in the oblast.

In planning the introduction of large-capacity computing systems for the VTsKP, we have in view a program of assimilation of the SM-4 small computers as peripheral and autonomously operating computers. Plans call for installing the first of these machines in 1980 directly in the oblast planning commission for preparation, input and correction of information and execution of autonomous plan calculations in real time. Subsequently, plans call for using this type of computer in the major city rayon planning commissions.

Simultaneously with the establishment of the VTsKP, which is to service the ASPR of the Sverdlovskaya Oblast Planning Commission as one of its central tasks, it is to be linked with the "horizontal" information links of all sectorial computing centers, and then with the computing centers of the industrial enterprises, to effect the transition of planning and management of the oblast economy to a new level.

For this purpose, in our view, an independent department "ASU and Computer Equipment" has to be set up under the Sverdlovskaya Oblast Executive Committee (and not under the oblast planning commission).

While introducing computer technology, we continually keep in mind the end result to which this great and difficult effort must lead--enhancement of the efficiency of production.

The measures to introduce computer technology are a component of the complex program for raising labor productivity which is being developed in accordance with the decree by the bureau of the Sverdlovskaya Oblast committee of the CPSU for the 11th Five-Year Plan. And there is no doubt that introduction of the computer equipment along with the extensive organizational work being done under the direction of the oblast committee of the CPSU and the oblast executive committee will earnestly promote that.

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SYSTEMS ANALYSIS, DEVELOPMENT IN THE TRANSPORTATION CONSTRUCTION INDUSTRY

Moscow TRANSPORTNOYE STROITEL'STVO in Russian No 6, Jun 80 pp 37-38

[Article by V. M. Pashkovskiy, candidate of economic sciences, TsNIIS [All-Union Scientific Research Institute of Transportation Construction], in the section "Economics and Management": "Methods of Developing Automated Enterprise Management Systems in the Industry of the Ministry of Transportation Construction"]

[Excerpts] The decision to develop an ASUP [automated enterprise management system] in a particular enterprise of the industry, and not in some other one, should also be justified. And here the problem arises of choosing enterprises where establishing an ASUP may yield the greatest economic effect or ensure the achievement of other tangible results. To solve this problem when developing an ASUP in the industry of the Mintransstroy [Ministry of Transportation Construction], a new approach was used, one which provides for a preliminary selection of facilities for management with an ASUP from the positions of the interests of the sector and the national economy.

To perform this task, the stages in developing an ASUP directly in an enterprise were preceded by a stage of a pilot survey and analysis of the peculiarities of the industrial enterprises in the sector and the conditions under which they perform their productive activity. These studies were made by the collective of the laboratory for the ASUP of the TsNIIS [All-Union Scientific Research Institute of Transportation Construction] according to the theme of US-01-72 r. [section] 36, "Establishing Standard Automated Management Systems, Subsystems and Tasks Based on Classification of Industrial Enterprises."

It was established that the majority of the industrial enterprises in the sector (about 70 percent) are small organizations with up to 400 people and production volume of not more than 2 million rubles. Setting up an independent ASUP in such enterprises, as experience in other sectors has shown, in clearly inadvisable and they should be included in an ASU [automated management system] for a trust.

From the point of view of applying computer technology and economic and mathematical methods in this structure of industry, the need for concentrating industrial enterprises of the sector, producing similar products, into larger associations was established.

Besides the small, the group of enterprises for which it was decided to not develop independent ASUP included part of the medium (from 400 to 800 people and production volume from 2 to 5 million rubles) and of the large (over 800 people with production volume of 5 million rubles) enterprises operating with local raw materials. These included: lumber mills, brickyards, stone and gravel, lime, ballast, cementing materials and some others. As a rule, these organizations produce a small number of items (three types of brick, four grades of gravel, etc.), have no shops, a simple management structure, small quantity of economic and technical documentation circulating in subdivisions (up to 100 documents), and supply themselves fully with needed raw materials of local production (sand, clay, etc.). The traditional methods of management used in these enterprises are quite satisfactory.

As a result of the survey of the industry of the Mintransstroy, the need and possibility of developing three standard systems by the efforts of specialized organizations of the sector was established: an ASUP for mechanical maintenance plants, an ASUP for plants making ZhBK [reinforced concrete structures], and an ASU for a trust of industrial enterprises.

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UZBEK ACADEMICIAN ON ADP SUPPORT TO CHEMICAL INDUSTRY

Tashkent SOVET OZBEKISTANI in Uzbek 19 Jul 80 p 2

[Article by T. Bekmuratov, chief vice-director of the Automatic Data Processing Research-Production Union of the Uzbekistan SSR Academy of Sciences, doctor of technical sciences, and professor, and V. Hajimatov, chief of the Science Office of the Uzbekistan SSR State Planning Committee: "The Product of Years of Effort"]

[Excerpts] An automatic data processing system developed by a group of scientists and specialists, under the direction of technical sciences professor N.R. Yusufbekov, and put into operation in the Navaiazat Production Association and in the Navaiy Electro-chemical Factory, have made possible the long-term, active, and operational management of factory production and economic activities. Now work being carried out can be planned completely, not just on a monthly or quarterly basis, but for each day, and each hour. Aided by this system it is possible to keep under control all processes, from the delivery of raw materials to the warehouse, until they are turned into finished products.

This system, created by Uzbek scientists and specialists, is now being used widely in the factories of fraternal republics as well: the Tashkent Varnish and Paint Factory of our republic, the Rostov Varnish and Paint, the Chimkent Fosfor, the Dneprodzerzhinsk Azot and Leningrad Krasnyy Khimik Production Associations and the Crimean factory for titanium tri-and di-oxide. As a result of the use of automatic data processing systems, that have been developed, in industry, and the working of technical achievements gained from these systems, in particular, into a number of automatic data processing systems in chemical industry factories, there has been an economic savings of more than 3.5 million rubles.
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USING COMPUTERS, AUTOMATED SYSTEMS MORE EFFICIENTLY

Moscow MUKOMOL'NO-ELEVATORNAYA I KOMBIKORMOVAYA PROMYSHLENNOST' in Russian No 7, 1980 pp 7-8

[Article by Y. Kondrina, chief of the Administration for Development and Introduction of Automated Control Systems of the USSR Ministry of Procurement: "Ways To Increase the Efficiency of Automated Control Systems and Computer Technology"]

[Excerpts] During the 10th Five-Year Plan the scope of tasks to automate the principal management functions of ministries, grain products administrations, and enterprises was broadened and deepened. The volume of balance, planning, and analytic tasks for which the ASU's [automated control systems] use optimization methods was increased slightly. At the present time the breakdown of tasks is as follows: 10 percent optimization, 20 percent balance, 20 percent planning, five percent analytic, and 45 percent accounting.

The Main Computing and Information Center uses a YeS-1022 computer to perform 90 tasks and does 28 others on calculating equipment.

Various problems have not been resolved in designing the first and second stages of the ASU's, among them: increasing the volume of optimization, planning, and balance tasks within the total scope of the ASU's; adequate information compatibility and interaction of ASU's on different levels, as well as the software compatibility of job sets that perform management functions of the same name; information coordination among particular subsystems and even jobs included in these subsystems; the problem-solving procedure for many tasks; the large volume of data prepared on punched cards, which gives rise to numerous mistakes in preparing data and copying; the fact that not all projected solutions are based on packages of applied programs for YeS computers; failure to coordinate all tasks with the automated information system; failure of scientific plans to treat the questions of machine management of classifiers of technical-economic information, and others. All these things reduce the efficiency of the ASU's. The head institute, VNIIZ [All-Union Scientific Research Institute of Grain and Grain Products] must improve its coordination of work by co-performers and raise its exactingness with respect to documents being developed. Moreoever, some of the design work on ASU's should be done at the information-computing centers of the ministries of procurement of the RSFSR, Ukrainian SSR, Kazakh SSR, Belorussian SSR, Moldavian SSR, Latvian SSR, Estonian SSR, Voronezh Administration of Grain Products, and Main Computing and Information Center of the USSR Ministry of Procurement. This will not only improve the quality of designs but also reduce costs greatly.

The cause of the decline in the efficiency of ASU's and computer technology is the still-inadequate level of organization work. Many Union republic ministries of procurement and administrations of grain products still have not set up ASU divisions or groups or ratified statutes for their formation. Even organizations that have such divisions and groups often fail to clearly delineate duties between them and information-computing centers. As a result of all this plans for the introduction of computer technology are not drawn up and the level of planning assignments is inadequate. The annual plan for introduction of computer technology is not a component part of the plan of economic and social development at all Union republic ministries of procurement. The balance commissions do not always review the results of the work of information-computing centers, stations, and group service points. In many cases the launching of tasks into experimental and industrial use is held up, which also reduces the efficiency of use of computer equipment.

In large part the efficiency of ASU's depends on the selection of tasks which is planned for the computer. The scientific-technical societies have an important role to play in this, but thus far they have not set up operational groups and sections for ASU's. The structural subdivisions of the ministries and administrations of grain products have not confirmed specific specialists who are responsible for the practical introduction of planning and management of computer technology. As a result of these shortcomings, technical and working documents for ASU's are not monitored thoroughly enough by all interested structural subdivisions and review periods drag on for up to 2-6 months, which increases the cost of the work, disrupts the introduction of tasks, and reduces the load on the machinery. In other words, it reduces the efficiency of the ASU's.

One of the most important factors in the efficiency of operating ASU's is the technical base, the preparation and transmission of data directly from the enterprises. A great deal has been done in this area, but many Union republic ministries and administrations of grain products are not giving adequate attention to improving hardware, above all to installing highly productive computers at information-computing centers, using equipment that prepares and feeds data from magnetic media, and improving the use of reference-norm information and packages of applied programs.

The information-computing centers of the ministries of procurement of the Turkmen SSR, Tadzhik SSR, Kirgiz SSR, Armenian SSR, Azerbaijan SSR, and several administrations of grain products of the RSFSR Ministry of Procurement are still equipped with Nairi class machines which greatly diminish the capacity of the ASU of the USSR Ministry of Procurement.

Enterprises and organizations of the USSR Ministry of Procurement have 61 computers and 26,000 units of computer equipment with which they are supposed to improve planning, accounting, and management methods. But the report figures of the Union republic ministries of procurement show that computer technology is not always used efficiently. In some ministries the Ryad machines are not adequately loaded. The workload of these machines at the Belorussian SSR Ministry of Procurement in 1979 was 9.64 hours compared to the plan figure of 15 hours. At the Ministry of Procurement of the RSFSR the load on Minsk-32 machines was 15.3 hours while the plan was 30 hours; for the Novosibirsk Administration of Grain Products the actual load was 9.1 hours, compared to a plan figure of 12.1.

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AUTOMATION OF BANKING OPERATIONS

Moscow DEN'GI I KREDIT in Russian No 5, 1980 pp 25-30

[Article by P. V. Dyamlov, deputy chief of the USSR Gosbank GVTs [main computing center]]

[Excerpt] The number of Gosbank institutions served by computing centers is continually growing; in 1978, another 52 institutions received this service, and 87 more in 1979. As of 1 January 1980, 469 Gosbank institutions and 25 offices were being served by computing centers.

The rates for Gosbank institutions switching to computer center services could be even higher; the computing capacity for this is quite adequate; however, due to difficulties in getting information from bank branches to the computing centers and back, work in this direction has not been widely expanded.

Currently, 105 institutions input information from punched cards; 364 institutions input information over communication channels using intermediate media; and 160 institutions directly input data through communications into a computer.

However, it should be noted that input of information for solving problems on a computer, using an intermediate medium (punched cards or tape), creates a number of significant technological and technical problems. Particularly inadequate is the process of transferring data from source documents to an information carrier that is used only once. Punching and inputting data from cards requires substantial outlays for verifying the data and promptly delivering the cards; it should also be noted that the 45-column cards used in a number of applications does not provide for completeness of input of individual requisites due to the card's limited data field. The method of inputting information from paper tape, used by computing centers, does not provide protection from subjective operator errors and garbles occuring in data transmission over telegraph channels.

Considerable difficulties are also being noted in data adjustment; they stem from the increased number of Gosbank institutions served and the distance between bank branches and computer centers; they are also growing due to unreliable intraoblast telephone communication between the center and the Gosbank institutions, which complicates prompt adjustment of even document totals.

Also consider that the working day of economists, who adjust the data, at the computing center is shifted to the second half of the day because the data arrives from the branches after noon.

In view of all this, computer center employees are systematically engaged in improving the process of data preparation and transmission.

The most advanced method today of delivering data to a computing center is to transmit the data from the bank branches to the computing center over communication channels directly into the computer avoiding intermediate data media.

The lack of terminals, the most satisfactory means for transmitting and processing bank data under these conditions, has forced developers to resort to teleprinter devices with reels, connected through electric communication channels directly to a computer.

The U-685 and U-686 devices were especially designed to interface telegraph communication channels with a computer; in the transmission process, they convert electric signals and arriving data.

This data exchange system was designed in such a way that in addition to receiving the data over the communication channel from bank institutions, the computer simultaneously verifies the data transmitted by the operators and sends controlling reports to organize the work of all the operators at the same time.

The data is actually transmitted in the interactive mode, which in general terms works as follows. The sending operator keys in the required data combinations to ask the machine for permission to begin working. The computer program analyzes the request and immediately sends a reply to this same teleprinter.

When an affirmative response is given, the operator begins transmitting data by previously grouped batches of documents, using a specific data transmission format for each document type. As mentioned earlier, upon receiving the data from the operator, the computer verifies it at the same time by using an entire complex of programmed logic verification to ensure the required data validity.

In addition to the hardware check of the incoming data, it undergoes programmed checking based on superfluous information being input. This may include protection of personal account numbers, numbers of branches in the MFO [interbranch turnover] by a "key" computed according to a previously established rule, transmission of a document sum with repetition, check on the acceptability of the values of Gosbank institution numbers, dates, etc.

If an error is detected in any of these cases, the machine asks the operator to retransmit the erroneously sent document; then the operator retransmits the document rejected by the machine.

If the transmission is correct, the machine accepts the document and asks the operator for the next transmission; in the event of repetition of an error, the operator sends the document to a monitoring group for checking.

This method of remote data transmission from bank institutions by telecommunications directly to a computer, using a centralized method to detect operator errors, has been used by the USSR Gosbank's Main Computing Center for some time now to receive information from 24 Moscow city and oblast institutions; and to two of them (Stupinskoye and Istrinskoye), results of developments are being transmitted on a trial basis, i.e., printing of positions of personal accounts and other forms is done directly on the teletypes installed in the institutions themselves.

The computing center of the Rostovskaya Oblast office of the Gosbank began operating in a similar way in 1978. Originally, several remote institutions in the Rostovskaya Oblast switched to this method, then the city office, and by the start of 1979, all institutions, served by the Rostovskiy computing center, had switched to this method of data transmission.

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COMPUTER CONTROL OF BUS TRAFFIC

Moscow AVTOMOBIL'NYY TRANSPORT in Russian No 6, 1980 pp 21-23

[Article by S. Khapov, Kabardino-Balkar Transport Administration]

[Excerpts] At the present time one of the most important tasks facing workers of bus transportation is increase of the regularity of movement on urban bus routes. In connection with that, more and more attention is being acquired by the creation of automated systems for gathering and processing data on the regularity of bus traffic. Such systems permit monitoring in real time the number of buses working on city routes and the time at which they pass intermediate control points, obtaining information about excessive deviations from schedules and having data on the actual intervals of bus traffic. That information goes to an operator at the monitoring and control panel of the central dispatcher service. Without such operational data the central dispatcher service workers are in practice unable to evaluate a situation that has developed on a bus route and make an optimum decision.

With the introduction of various systems for monitoring and controlling city bus traffic, electronic computers have been used more and more widely to process information arriving at the central dispatcher service and to issue the necessary parameters to the screen of the operator's panel of the data display system. For example, at Nal'chik since March of last year a computer complex created on the basis of the M-6000 computer provides for the entire process of reception, processing and readout of information coming from monitoring points of the bus routes, with issuance on the central dispatcher service screen of data necessary for the monitoring and control of bus traffic.

Information is automatically issued to the central dispatcher service on the emergence of buses from the garage and departures from the line, on the number of buses working on a line, the time of passage of control points by them and the committed deviations from the schedule. The central dispatcher service operator, having such data for any moment of time of the day, can make a decision about change of working conditions of buses, can change them from route to route and before the start of the peak hours adopt necessary measures for rational organization of passenger transport.

rubles) an increase of the volume of passenger transportation by 4.6 percent will be achieved during a reduction of the total passenger places on urban buses by 4.4 percent (as compared with 1978). Incomes increased by 7 percent in that case, hourly receipts by 5.2 percent, and gross income per passenger place by 6 r 30 k.

At the present time the regularity of bus traffic amounts to 93.6 percent for a growth of the planned number of trips by 3.1 percent and a reduction of the number of unperformed trips by 7.9 percent.

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CONSTRUCTION IN THE STATEWIDE AUTOMATED SYSTEM

Moscow STROITEL'NAYA GAZETA in Russian 28 May 80 p 3

[Article by I. Vlagodarnyy]

[Excerpt] The builders have proposed their own fragment for the statewide automated system. Over 500 primary queues can now participate in the statewide system, 60 of them in union and union republic ministries and territorial glavks, about 400 in construction and installation trusts and house-building combines, and more than 20 at enterprises.

The usual task is to formulate alternatives of the plan and flows with definition of the requirements for material, manpower and financial resources for the glavk, trust and construction and installation administration. But this means hundreds of man-hours expended on planning, and far from always does an optimum alternative result. The scientific and technical development of the "Potok" administration of the Glavmosoblstroy automated construction control system permits calculating the most exact alternative by means of a total of two engineer-economists, two computer operators and two estimators. Of course, with the participation of a "YeS-1022" computer. All seven participants expend about one half hour on obtaining a directive construction schedule and an operation schedule. And the calculated annual saving is 9,000 rubles on a single house-building combine...

It is known how high the price is for good advice, especially that given in time. The "value" of advice of the automated system for calculation of optimum routes of motor vehicle traffic is 1.26 million rubles. Such is the annual saving from information given by the system to automated control systems of organizations and subsystems, which reduces the transport distances by more than 5 percent on the average.

The 20 subsystems of the first queue of the Ministry of Transport Construction automated control system give an idea of how great the possibilities are of systems analysis and computer technology in the improvement of control on the level of the ministry. The first queue of the automated control system permits forming plans of subcontracing work and compiling schedules for the distribution of metal structures and petroleum products by organizations. It has taken on itself an enormous volume of calculations, eliminating manual operations and by the same token increasing the effectiveness and quality of control of construction.
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POST-OLYMPIC USE OF IBM/370

Moscow SOVETSKAYA KUL'TURA in Russian 22 Aug 80 p 1

[Article by G. Pavlov: "New Jobs for the Computer"]

[Text] Just after the bouquets of the closing fireworks of the 1980 Olympics had died away, leaving small puffs of smoke, the cassettes of the electronic machines of the ASU [Automated Control System] of the Moscow Games stopped their incessant running.

This was certainly a well-deserved rest. After all, during the games the electronic nerve center of the Olympics had made up 10 million reports and transmitted more than 100,000 answers to questions to terminals located throughout the city and connected with the machine. Each day an electronic newspaper, STARTY I REZUL'TATY [Schedule and Results] came out in 20,000 copies, offering the latest information from the athletic competition.

Who is going to use this highly complex and, we might add, expensive equipment now?

Vladimir Viktorovich Ul'yanov, deputy chief of the technical administration of the ASU Olympiada, responds:

"During the games the main load was carried on three IBM/370 machines and two double-processor M 40-30 computers produced in the USSR. The two M 40-30's are the property of the USSR State Committee for Sports. They are excellent forecasters. For example, they can store the training regimes of thousands of athletes, predict in advance when they will be at their peak, and issue the necessary information for coaches or journalists. Needless to say, such equipment will not stand idle. The package [illegible] programs will be revised for the Central Army Sports Club, Dinamo, and the stadiums and riding schools of the capital.

"I should also mention the Pozitron system that was used to put out the Olympic newspaper. The newspaper MOSCOW NEWS will now be produced with it using the progressive photoprinting technique.

"It is widely known that Soviet specialists built the ASU Olimpiada on the basis of four fast computers and various other sophisticated equipment. This complex is going to be turned over to the Moscow City Soviet. The new and permanent job of this sophisticated, high-speed electronic equipment will be managing the intricate systems of a city with millions of people, the capital of the USSR. One IBM/370, for example, will soon be put to use in the public health system.

"This machine will be directly linked to the telephone number '03' which is dialed in case of sudden illness or accident. Much faster than any dispatcher it will determine the closest emergency rescue brigade and send doctors to the necessary address. The computer memory will have to be filled with new information for this role. The terminals will also be useful here; they can be outlying control consoles."

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QUESTIONS ON INFORMATION COLLECTION AND PROCESSING

Moscow VESTNIK STATISTIKI in Russian No 8, Aug 80 pp 45-45

[Excerpts from article by G. Petrosyan]

[Excerpts] At the present time there are in operation in this country more than 2,500 automated enterprise and association control systems (ASUP) and more than 200 branch (ministry and department) automated control systems. The first stages of republic automated control systems have already been created in a number of union republics. A certain amount of work has also been done along this line in the Armenian SSR, where there are 78 computer centers and organizations using computers, of which 28 are in operation in ministries, associations, enterprises and organizations. Most of the centers are equipped with third-generation computers.

Rayon (city) information and computer stations and centers have been organized and are in operation in the Armenian SSR. They serve more than 1,300 enterprises and organizations, including 629 agricultural enterprises, 119 centralized accounting departments, and 153 industrial, 87 construction, 78 trade, 68 motor transport and more than 300 other enterprises and organizations throughout the national economy. Labor-intensive areas of accounting work are being mechanized for the organizations that are being serviced. Integration mechanization of bookkeeping operations has been introduced in individual agricultural enterprises. Work is also being done to expand the subject matter being covered and to obtain new clients. By a decision of the Yerevan City Council of People's Deputies, all the organizations and enterprises subordinate to it have been attached to the Yerevan City Computer Center, part of the job of which is to carry out the mechanized processing of accounting and statistical information for enterprises and organizations in Yerevan.

Integrated mechanized of statistical reporting has basically been introduced at the rayon level by the republic's TsSU [Central Statistical Administration]. The circle of statistical indicators given to local supervisory agencies that control the economics of a rayon has been enlarged. Teletype communication links have been installed in 11 rayons; they are used to transmit statistical information to the Republic Computer Center of the Armenian SSR's TsSU.

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ON THE BASIC DIRECTIONS FOR DEVELOPMENT OF THE ASGS

Moscow VESTNIK STATISTIKI in Russian No 8, Aug 80 pp 3-12

/Excerpts from article by N. Ivanov and V. Zav'yalov/

/Excerpts/ The second stage of the Automated System for State Statistics (ASGS) will be put into operation at the end of 1980.

Work on the creation of the ASGS that was begun in 1971 made it possible to put its first stage into industrial operation at the end of 1975. This stage was based on 46 complexes for the electronic processing of information in the most labor-intensive areas having large volumes of information to be processed. The systems used in the complexes were predetermined by the functioning of all the USSR TsSU /Central Statistical Administration/ system's VTs's /computer center/ according to unified informational support and hardware and software, with transmission of the results from a lower to a higher ASGS level on technical carriers or over communication links. The introduction of the ASGS's first stage made it possible to combine all of the USSR TsSU system's VTs's into a unified computer network.

In accordance with the assignment given it by the State Plan for Economic and Social Development, work on the creation of the ASGS's second stage is being completed in the USSR TsSU system. This work is aimed at the further development of the concept and technology of the processing of statistical reports used in the first stage of the ASGS, and involves converting the EOI /electronic information processing/ complexes to a new technical base (the YeS EVM /Unified System of Electronic Computers/, increasing the degree of integration, and improving the EOI complexes (as well as developing new ones). Another sphere of activity is the realization (during the 10th Five-Year Plan) of a complex of planning and experimental projects that are related to the creation and introduction of seven extremely important functional subsystems featuring progressive technology in the automated processing of statistical information through the use of the YeS EVM and data transmission facilities, automated data banks (ABD), and analytical complexes for the comprehensive investigation of the processes of public production on the basis of an object-by-object registration of data.

In connection with this, in the experimental order the first stage of the ABD was created on three ASGS levels: union (USSR TsSU's GVTs /Main Computer Center/), republic (the RVTs's /Republic Computer Center/ of the Belorussian and Estonian SSR's TsSU's) and oblast (the VTs of the Tomskaya Oblast's Statistical Administration).

For the second stage of the ASGS, a system for the remote processing of statistical information (STOSI) is being developed.

A number of important projects related to the ASGS's third stage will be implemented during the 11th Five-Year Plan.

Work being done to organize the joint functioning of the ASGS and the ASPR /Automated Control System for Planning Calculations/ must provide for calculations for five-year and annual plans on the basis of assignments for monitoring the pattern of plan fulfillment and making an integrated analysis of statistical and accounting information with the extensive use of real and cost production balances and the distribution of output, production capacities, labor and financial resources and the system of planning standards.

In the process of ASGS interaction with the ASPR, it is intended that data be represented by in standardized forms and on machine carriers, as well as in the experimental order for communication links on the basis of automatic retrieval of the required information in an ABD upon requests from users. In connection with this we must solve problems concerning the technical, programming and legal compatibility of automated systems, insure the comparability of information and the complete satisfaction of its consumers by the composition of the reporting and planning indicators and the forms and dates of their presentation, and protect the data against unauthorized access.

Analogous work to insure joint functioning must be performed with other interbranch and extremely important branch ASU's /automated control system/ on the basis of joint work plans or programs. In connection with this, we must take into consideration the requirements, goals and assignments for creating the Statewide Automated System for Collecting and Processing Information for Accounting, Planning and Control (OGAS), as well as the role and place of the ASGS in the OGAS as one of its basic functional units.

In the third stage of the ASGS we intend to continue to create automated statistical data banks. As the standards in this, we must use the results of the planning and experimental work that was done during the creation of the ASGS in the 10th Five-Year Plan. Automated data banks as territorial components of a systemwide ABD must be created in all the TsSU's of the union republics and in 30-35 of the large statistical administrations on the oblast level that have annual volumes of processable statistical information of more than 100 million characters. In a number of VTs's in which the creation of a territorial ABD component is not feasible at the present time, a variant of remote subscriber access to the ASGS's ABD will be worked out. Consequently, in the ASGS's third stage the territorial distribution and the interaction of the separate ABD components must be realized according to the interconnected method.

In the USSR TsSU's GVTs, the Belorussian and Estonian SSR TsSU's RVTs and the Tomskaya Oblast Statistical Administration's VTs, where work on the creation of the ABD's first stage is being done at the present time, subsequently there must be planning and experimental work for the creation of data bases for the other functional subsystems, while keeping in mind in connection with this the development of standardized planning documentation for the organization of corresponding data bases in all the territorial components of the ABD.

During the first stage it has been planned to introduce the STOSI in those VTs's where ABD's are being created or on the basis of which VTsKP's [coolective-use computer center] are being organized. The STOSI must provide for the collection, transmission, remote processing and distribution of the statistical information from the EOI complexes, including periodic statistical reporting, the collection of which is also provided for with the use of a telex service and facilities for firect computer input. The load must be redistributed by transmitting the original data and programs to VTs's that have spare machine time, with delivery of the results to the required address for the purpose of accelerating the processing of statistical infromation in the ASGS.

The STOSI must support the functioning of the ASGS's distributed ABD in the matter of remote access to the information resources of all levels of the ABD and implement the exchange of information among them, transmit data with different urgency categories, and automate the interaction of the ASGS with the ASPR and the branch ASU's over communication links.

In connection with this, work should be done to insure protection of the data against both unauthorized access and destruction when it is being entered and stored in the data bases and transmitted over the communication links and hardware of the STOSI. These problems must be correlated with the general direction of the work on the creation of the Statewide Network for Data Transmission (OGSPD).

Operational polygraphy subunits must be further developed by equipping them with domestic and imported equipment, "Romayor-314" printers, "ER-420" electrographic rotary presses, and "Xerox," "RBTs-900," "Ubiks-V" and other electrographic equipment, while regional units should be equipped with "Tsiklos" automatic rotary presses, which should further reduce the amount of time needed to publish statistical materials and improve the quality of their polygraphic execution.

During the 11th Five-Year Plan it is planned to complete the equipping of VTs's on the oblast level with computers from the unified system and install additional computers for the organization of ABD's with a peripheral gear configuration that insures their efficient operation. In addition to this, it has been proposed that the VTs's in the USSR TsSU system be equipped with Series Ryad-2 YeS EVM computers, which are characterized by an increase in the productivity of the central processors, an enlarged internal storage capacity, and expanded facilities for multiprocessor and multicomputer organization.

Special attention must be devoted to the complete outfitting of existing and newly delivered computers with modern peripheral gear and additional ATsPU's /alphanumeric printer/, internal storage units and large-capacity magnetic-disk storage units. In connection with the complete outfitting of USSR TsSU's computer network with powerful YeS EVM units, it is intended to carry out projects to develop the utilization of the YeS-1022 computer as a satellite computer.

In the third stage of the ASGS there must be a gradual transition to data preparation without the use of punched cards or tape, which will provide an improvement in the quality of the technical carriers' preparation, reduce the number of errors in the original data, shorten the preparation time, and reduce the requirement for paper-type carriers. The entering of information from documents directly onto magnetic tape will be done with multipanel data preparation systems of the YeS-9003 type, which combines 16 operator's consoles, and group data preparation systems of the YeS-9150 type, which can handle up to 32 operator's consoles, as well as data preparation units based on magnetic tape cassettes and flexible magnetic disks.

In the third stage of the ASGS we should also see developed the use of programmable subscriber points of the YeS-8504 type, which provide both information preparation on technical carriers and arithmetic and logic monitoring, as well as automatic transmission over communication links for the purpose of subsequent remote processing of the information at a VTs.

During the next five-year plan we must do experimental work on obtaining statistical information on technical carriers directly from enterprises (organizations). It has also been proposed that work be done in the area of using new readers of the "Robotron-1375" type when processing materials for large, one-time statistical projects and the future general census, with the idea being to implement further decentralization (to each oblast) of the work of re-entering data from a primary document on a computer information carrier in the autonomous mode; that is, without the use of YeS EVM units.

The performance of work to introduce a microfilm system, as well as the output of data on microfiches, is specified in the experimental order.

No small amount of attention must be given to equipping the computer network with organizational engineering facilities.

On the rayon level, it is proposed that the technical base of the ASGS's third stage be developed by using M-5010 and M-5100 PVK's /punchcard computer complex/, as well as other domestic and foreign hardware. In the "rayon-oblast" link, R-381 units in the "computer-computer" mode, as well as subscriber points and terminal units for exchanges with computers installed in the higher-level VTs's, are to be used for exchanging information between the M-5000/5010/5100 PVK's and YeS EVM units over switchable and nonswitchable communication links. In the rayon centers it is advisable to use the R-810 data preparation system (SPD), which provides for the input of data from several simultaneously operating keyboards and information storage in a memory with a replaceable magnetic disk. Along with the small computers and the PVK's, at the rayon level we should use billing and accounting machines of the "Iskra-534" and "Iskra-554" type, "Daro-1720" automatic keyboard-calculator billing units, electronic data preparation units of the "Daro 1732" type, and so on. Machines of this type must also be used to process information not only on the rayon level, but also on other ASGS levels.

Preliminary calculations made at USSR TsSU's Scientific Research Institute show that the introduction of the ASGS's third stage will make it possible to shorten the amortization period for the additional capital investments for computer technology to 4 years instead of the 6 years required for the second stage.

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ORGANIZING PROBLEMS OF SMALL COMPUTER MAINTENANCE

Moscow VESTNIK STATISTIKI in Russian No 9, 1980 pp 34-38

[Article by L. Gusev, Ye. Khibrikov and V. Chuprikov]

[Excerpt] It is frequently more convenient for enterprises to repair computer equipment through their own efforts. However, decentralized maintenance of computer equipment has a number of negative aspects. They include increased consumption of spare parts caused by the need to create local reserves and also the possibility of computer equipment becoming idle due to a lack of spare parts. The need for qualified specialists in the field of computer maintenance also rises sharply on a country-wide scale with decentralized maintenance, along with additional material expenditures.

Therefore, an optimum form of small computer maintenance is very necessary.

There is positive experience in our country in organization of centralized computer equipment maintenance. For example, centralized maintenance of imported small computer and organizational equipment has been organized by enterprises of the VPO [All-Union Industrial Association] Soyuzschettekhnika of the TsSU [Central Statistical Administration] of the USSR; the VO [All-Union Association] SoyuzEVMkompleks for maintenance of computers of the "Ryad" series and so on has been created.

We feel that the possibilities of centralized maintenance of small computers must be investigated and that criteria must be selected for the most efficient conditions of operating them and for determining the optimum number of specialists who ensure the functioning of hardware.

An attempt has now been made to use methods of queueing theory to simulate processes of restoring the efficiency of small computers which make it possible to take into account the possible losses from waiting for repair and the idle time of personnel during the period between repair.

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EXCHANGE OF PATENT INFORMATION BY CASSETTES

Moscow MOSKOVSKAYA PRAVDA in Russian 27 Sep 80 p 3

[Article: "No Longer Fantasy: Patents on Cassettes"]

> [Text] September 25, Thursday. The USSR State Committee for Inventions and Discoveries received an unusual package. The International Center for Patent Documentation sent information on inventions and discoveries made during the week in the entire world.

About 20,000 documents had been placed in a compact package. This data was not recorded on paper. Magnetic tape has become the information medium.

The exchange of scientific and technical information. All countries need this today. In having the latest data on innovations and developments made by the world's scientists, specialists receive the capability of making use of the entire arsenal of inventions needed to develop any sector of science and production. Well, and besides that, "patent purity" is needed when products are exported.

The traditional information exchange method--on paper--presupposes many days of searching for data needed in a specific field. Patent service specialists have to leaf through entire volumes of references, official bulletins and cases with descriptions of inventions. Now they have begun to use a more progressive method. Information on inventions and discoveries is sent on magnetic tape; this makes the initial search much easier and speeds it up. The computer assumes a large part of the duties. It selects the needed information according to a specified descriptor, and displays the material found on a screen in the form of ordinary readable text. At a person's command, the computer can print out the documents needed on paper. This method makes it possible to save quite a lot of paper.

The All-Union Magnetic Tape Service for Patent Information has been set up in our country. The Poisk [Search] NPO [Scientific Industrial Association] of the USSR State Committee for Inventions and Discoveries has become its center. Arriving here are magnetic tape cassettes containing patent information from 47 countries and two international organizations. Extensive information has already been stored now and a data bank has been set up with 5 million patent documents, to which another 800,000 are added each year. Thirty-four scientific and technical information agencies have become subscribers to the service. In turn, they support 1,460 collective users.

An interdepartmental council has been set up to coordinate methodological guidance of work on preparing, processing and utilizing patent information on magnetic tapes. Its members are leading specialists from all-union, sector and regional NTI [scientific and technical information] agencies. The council's first meeting opens on October 2. Participants will have to respond to many questions that have arisen in the practice of the operation of the service.

Sent to Vienna once a week is a reply package from the Poisk NPO for foreign colleagues: a cassette with information on inventions registered in our country and the CEMA countries.
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PROGRAM PACKAGE FOR AUTOMATIC ANALYSIS OF ELECTROCARDIOGRAMS

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2,1980 pp 107-110 submitted 5 Mar 79, after revision 4 Apr 79

[Article by A. A. Pervozvanskiy, O. Yu. Kul'chitskiy, A. V. Sloushch, and Yu. V. Sokolov]

[Text] Processing and analysis of ECGs is an extremely labor-intensive process requiring the involvement of qualified specialists. According to the data in [1], the overall duration of manual ECG processing is about 15 minutes. At the same time, the ECG is a simple, highly effective means of diagnosing CV diseases [2]. The use of ECG for mass screening of the population evidently requires automated processing technique.

There are two basic methods for carrying out mass screenings [2]: parallel, where the test subject undergoes a series of tests and then the physician draws a conclusion on that basis; and sequential, where a conclusion is made following each test: "sick", "healthy", "undetermined". In the case of the response "sick", the subject is sent for a thorough examination and treatment, whle in the case of the response "undetermined", the subject is checked out in the next test.

In the first method of mass screening, the automatic ECG analysis system is called upon to produce a standard conclusion: in essence, to perform syndromal ECG diagnostics, whereas in the second one it has to give one of three responses. These problems are rather different and thus a program package performing automated ECG diagnotics is composed of two independent parts: the program of syndromal ECG diagnostics and the diagnosis "sick versus healthy".

The source data for ECG diagnosis are 12 recordings of the dynamics of potential differences betweeen various points on the surface of the human body. The measured potential differences are due to changes in the cardiac electric field as a result of contractions. Each recording, 3-4 seconds in duration, contains several cardiac cycles and represents sequential pulses (peaks). Within one cardiac cycle the peaks have been given Latin letters P, Q, R, S, T, V. Diagnosis makes use of so-called ECG features: the results of measurement of amplitude and width of the peaks, the intervals between them, the shape of the peaks, etc. Measurement of signs in ordinary medicine is done manually, while in computer diagnostics it may be done automatically using analog-digital conversion and special programs.

The problem of the "sick-healthy" diagnosis is that of a dual alternative classification with the possibility of an undefined response and can be tackled rather simply, although it does have distinctive features which will be discussed below. The problem of syndromal ECG diagnostics is much more complex.

Let us explain the meaning contained in this study in the traditional term "syndromal diagnostics". Let the diagnosed object be assigned an n-vector whose components are ECG features. The syndromal diagnostics consists in establishing an unique correspondence to the n-vector X of features of the n-vector Z (N n), known as the conclusion. Each i^{th} component z_i of the vector-conclusion Z is known as the syndrome and may acquire one of a finite number n_i of values. The diagnostic rule in syndromal diagnostics is the functional relationship $Z = f(X)$.

Establishment of this rule is done based on the data base, i.e., the set of vectors $X^{(l)}$ for which the corresponding values $Z^{(l)}$ have been pre-established. This preliminary establishment in medicine is known as verification and is done by the testing physicians using ordinarily informal or poorly formalized rules.

It is easy to see that the problem of syndromal diagnostics may be reduced to the ordinary problem of multiple alternative classification, but the overall number of alternatives (classes) is equal to the product of $n_1 \cdot n_2 \cdot \ldots X\ n_N$, which corresponds to more than a thousand classes in problems of ECG syndromal diagnostics. Furthermore the number of vectors in the data base is of the same order and may not be greatly enlarged when the system is operating in real time. In addition, class membership is very distinctive. This relates to the natural circumstance that each element in the file is the result of patient examination (ECGs, numerical designation features and verification). In addition to the fact that this procedure requires substantial effort and time, it also requires the appearance of a patient belonging to a given class, i.e., one having a given combination of syndromes.

In view of this, standard procedures of multiple alternative diagnostics are not directly applicable here, and the problem of syndromal diagnostics (SD) should be considered separately. The procedure we have adopted may be characterized as structural decomposition of the problem of SD.

Classification is done in sequence according to each syndrome; at each i^{th} stage (level) multiple alternative classification with a number of classes n_i is done, which corresopnds to the number of possible values of the i^{th} syndrome. The data base includes all objects for which a given syndrome is verified; this leads, as a rule, to an abrupt increase in membership. The conclusion is constructed as a result of sequential determination of the syndrome values.

This kind of simple approach is even more effective if we consider existing a priori information: accumulated medical experience on the relationship between syndromes. In reality, obtaining one response for an earlier syndrome may preclude the possibility of detecting several versions for a following syndrome or even the need to classify in terms of this syndrome. Therefore, both the selection of sequences of syndromes and the nature of transition from stage to stage requires detailed a priori analysis in which thorough use should be made of the experience of the diagnostic specialists accomplishing file verification.

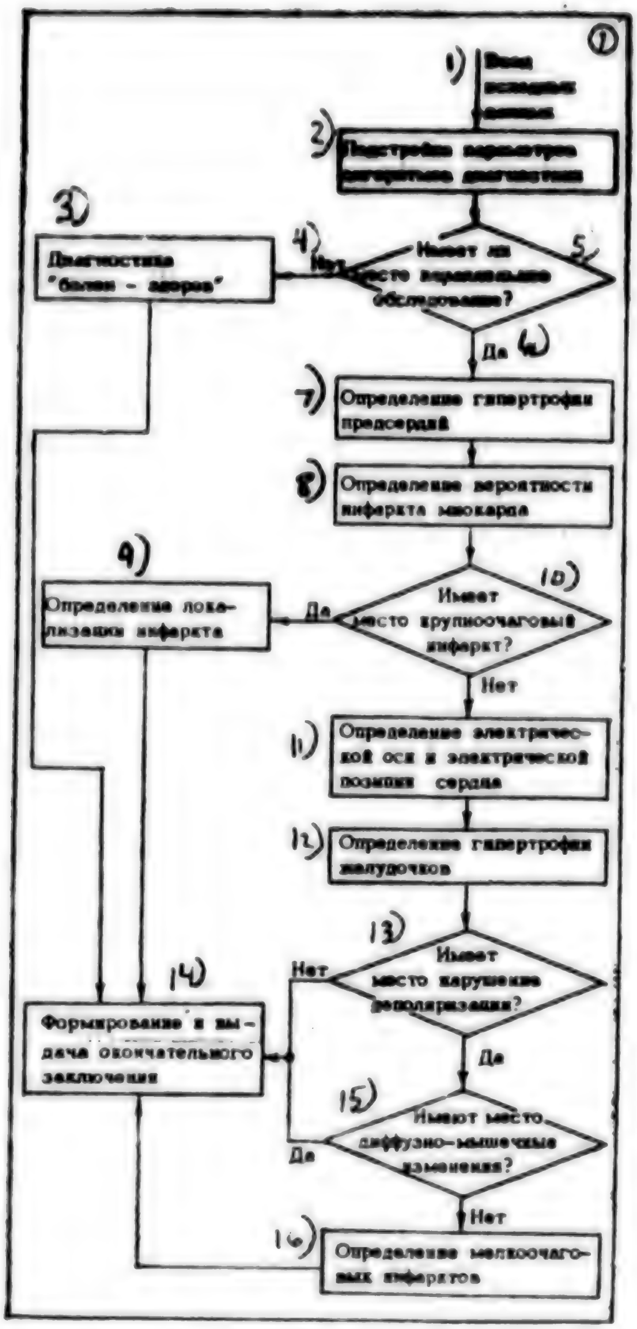
For the problem of syndromal diagnostics of ECGs based on prolonged dialog with the specialists of VMA imeni S. M. Kirova (Dr. Chireykin and medical candidate V. I. Yermolayev), a structure of diagnostics was drawn up which is reflected in the logic diagram of the control routine (Figure 1). The overall number of syndromes is $N = 7$. The number of alternatives for various syndromes is different ($n_1 = 4$, $n_2 = 3$, $n_3 = 7$, $n_4 = 6$, $n_5 = 4$, $n_6 = 6$, $n_7 = 2$). For convenience of presentation, let us indicate the list of syndromes in medical terms (localization of hypertrophy of the precardium; depth of infarct; localization of infarct; electrical orientation of the heart; localization of ventricular hypertrophy; types of disturbances to changes in polarity; types of small focus infarcts), although an understanding of the meaning of these terms is not absolutely necessary to describe the operation of the system.

The branching in the diagram (see Figure 1) signifies that after obtaining certain types of answers (alternatives) one makes a transition to one stage, and with other alternatives the transition is made to a different stage.

This routine complex for automatic ECG analysis makes it possible to conduct mass examinations using both the first and second methods. The use of structural decomposition for solving the problem of selection of an ECG conclusion made it possible to use the modular principle in designing the routine complex [3]. The complex contained such modules: input of source data; alignment of parameters of diagnostic algorithms; accomplishment of diagnostics of individual syndromes; "sick-healthy" diagnostics; formulation and output of the final conclusion. The control relationship between modules is accomplished by the control routine. The following were considered in designing the program modules [4]:

- functional completeness, independence and autonomy in makeup;
- one input and one output at a point which follows the call up instruction;
- lack of after-effect of later execution of routines ;
- standard organization of control and information links with other modules;
- possibility of parametric alignment of control links.

To design the decision rules of diagnostics of individual syndromes (see Figure 1) two approaches were used: medical statistics and pure statistics. The first approach was used to diagnose those syndromes for which the physicians had rather good ideas about the structure of diagnostic rules ensuring an acceptable classification. The problem here is to formalize medical rules based on dialog with the medical men, and second to determine the numerical values of coefficients based on the data base sample to minimize classification error. Classification error here in this case implies the ratio of the numbers of ECGs for which the syndrome value is incorrectly defined to the total number of ECGs in the sample.


①
1) Ввод исходных данных
2) Подстройка параметров алгоритма диагностики
3) Диагностика "болен - здоров"
4) Нет
Имеет ли место параллельное обследование?
5)
Да 6)
7) Определение гипертрофии предсердий
8) Определение вероятности инфаркта миокарда
9) Определение локализации инфаркта
Да
10) Имеет место крупноочаговый инфаркт?
Нет
11) Определение электрической оси и электрической позиции сердца
12) Определение гипертрофии желудочков
13) Имеет место нарушение реполяризации?
Нет
Да
14) Формирование и выдача окончательного заключения
15) Имеют место диффузно-мышечные изменения?
Да
Нет
16) Определение мелкоочаговых инфарктов

Logic diagram of control routine.

1. input of source data.
2. align parameters of diagnostic algorithm
3. "sick-well" diagnosis
4. no
5. parallel examination
6. yes
7. define precordial hypertrophy
8. define probability of myocardial infarction.
9. define infarct site.
10. is there large infarct?
11. define electrical axis and position
12. define ventricular hypertrophy
13. is polarization disturbed?
14. output of final conclusion
15. diffuse muscular changes?
16. define small focal infarcts

The purely statistical approach was used to diagnose those syndromes in which the medical rules were informal in nature. In that case, the decision rules are designed to solve the optimum statistical problem of hypothesis discrimination with constraints on classification errors [5]. It is then possible to have a vague response in doubtful cases while maintaining the classification accuracy at the desired level.

The medical statistical algorithm enables us to fully and accurately classify syndromes of infarct magnitude and localization, and also to determine the electrical orientation of the heart. The simplified block diagram of infarct diagnostics is shown in Figure 2. In the first block, based on analysis of R and Q wave amplitude (h_R and h_Q) and Q wave width (t_Q), we can establish the presence of large-focus (KO) myocardial infarction (MI). The presence of such an infarct may also be established by analyzing the shape of the curve between the S and T waves (ST). In this instance, if there there is no such infarct, the presence of a small focus (MO) infarct is defined and the appropriate response is issued. If, however, a large-focus infarct is detected, pathological conclusions are issued, according to which its localization is defined and the appropriate response is issued. This arrangement generally corresponds to the diagnostic logic of myoardial infarction according to ECGs.

The results of verification of the elaborated diagnostic routine for a given syndrome are as follows: for probability of infarction, 11 (2.5 percent) out of 416 ECGs were incorrectly classified; for localization, 25 (8.5 percent) out of 340 ECGs were incorrectly classified.

To diagnose the remaining syndromes and also define the "sick-well" status, the purely statistical approach was used. It was presumed that all features used for diagnostics are independent normally-distributed random quantities. The degree of correspondence to truth of the selected type of distribution was evaluated in terms of classification results. Evaluation of distributional parameters was obtained according to the data sample. The diagnostic routine works as follows (Figure 3): values of the probability densities f_i (X) are computed for each value of the syndrome; then a posteriori probabilities p_i (X) are plotted. If their maximum exceeds the threshold $\underline{a}$, it is then considered that the ECG has the appropriate syndrome value, otherwise the "undetermined" response is issued.

For example, let us cite the results of diagnostics of the syndrome of atrial hypertrophy using this algorithm (in this case, the dimension of the feature vector is 17): with a probability of classification error of 7 percent, the probability of output of an undetermined response was 3 percent; with a probability of error of 4 percent, it was 14 percent. The probability of classification error in the given case implies the ratio of the number of ECGs with inaccurately defined syndrome values to the overall number of ECGs for which we have obtained a specific response.

An aspect of the diagnostic "sick-well" algorithm is that the group of patients was not uniform, but consisted of four subgroups, corresponding to various diseases, in connection with which the function of the distribution density of patients is the sum of the density of four normal distributions with the corresponding a priori probabilities. The quality of diagnostics in the given case as such (dimension of feature vector 65): with a probability of classification error of 25 percent, the probability of undetermined response was 3 percent; and with a probability of error of 17 percent, it was 23 percent.

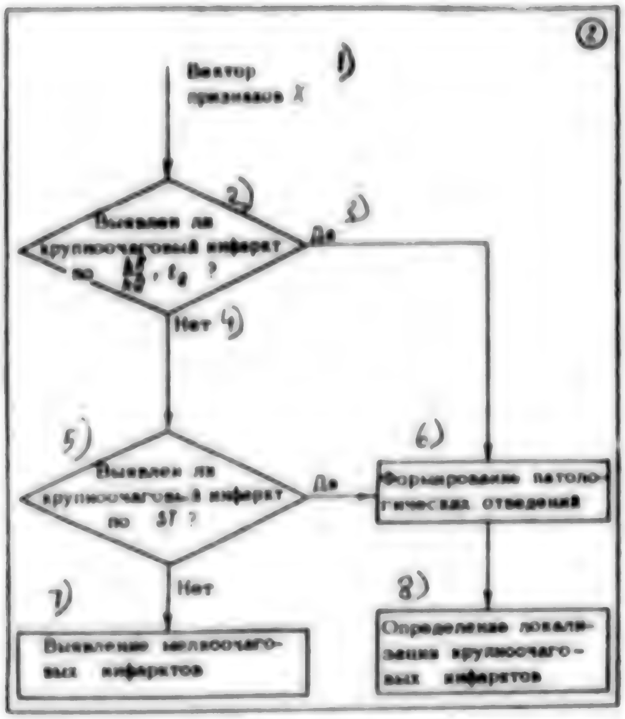

②
Вектор признаков X
1)
Выявлен ли крупноочаговый инфаркт по hR/hQ, tQ ?
2)
Да
3)
Нет
4)
5)
Выявлен ли крупноочаговый инфаркт по ST ?
Да
6)
Формирование патологических отведений
Нет
7)
Выявление мелкоочаговых инфарктов
8)
Определение локализации крупноочаговых инфарктов

Figure 2. block diagram of detection and analysis of infarct ECGs

1. feature vector X
2. Is large-focus infarct detected according to hR/hQ, t_Q?
3. Yes
4. No
5. Is large-focus infarct detected according to ST wave?
6. Shaping of pathological conclusions
7. Detection of small-focus infarcts
8. Determination of localization of large-focus infarcts.

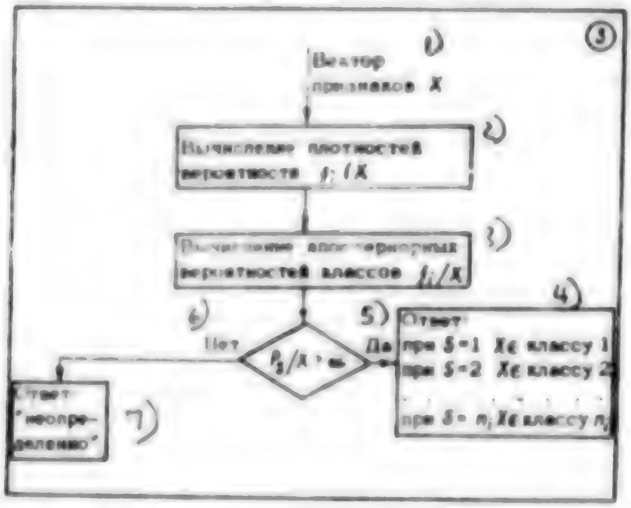


Figure 3. Block diagram of statistical classification algorithm

1. feature vector X
2. Compute probability density
3. Compute a posteriori probabilities of classes f_i/X
4. response: when S = 1, $X \in$ class 1; when S = 2, $X \in$ class 2.....
5. Yes
6. No
7. "Undetermined" response

As a whole, according to an evaluation of cardiologists, the quality of ECG diagnostics accomplished using the given set of routines is on the level of the average qualified physician. The set of routines for automatic ECG analysis, written in FORTRAN, has been elaborated for use as program-software on the M6000 mini-computer employed in automatic mass screening systems.

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AUTOMATED ARRANGEMENT OF AIRCRAFT EQUIPMENT

Kiev UPRAVLYAYUSHCHIYE SISTEMY I MASHINY in Russian No 2 1980 pp 126-128 submitted 20 Apr 79

[Article by V. A. Tikhomirov]

[Text] Not long ago the arrangement of the small quantity of equipment which was installed on board an aircraft (LA) involved the more or less convenient disposition of unrelated devices, units etc. Equipment was chaotically installed wherever it would go. The development of aviation required better devices and an increased number of units aboard aicraft, in addition to the development of new devices. But for a long time much of the equipment did not have widely branching communications features. The data from various devices to obtain certain information were related by a crew member.

In the past few decades, the value of manually obtained information has become questionable, in view of the increase in flight speeds and altitudes, new requirements for ensuring safety ane regularity of flights in inclement weather including zero-visibility IFR, the increased density of flights, and the expansion of jobs tackled by aircraft. The need has come of age to automate the processing of information obtained from various on-board sensors and specific stages of flight. Equipment complexes have emerged which combine all kinds of equipment in order to solve particular flight problems.

With the introduction of equipment complexes which have an enormous network of complex, branching communciations links, the aircraft has become literally subjugated by the many thousands of conductors which can weigh as much as several tons.

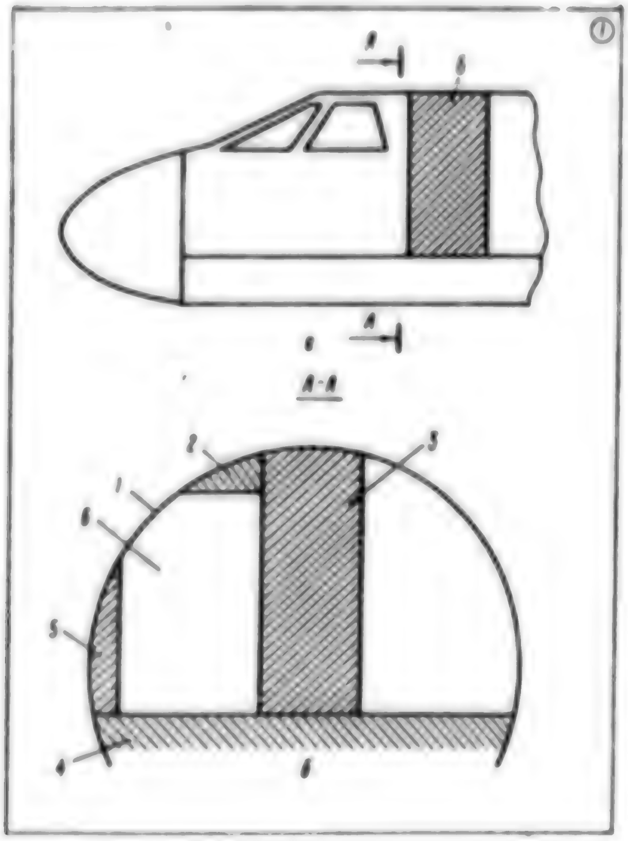
The quest for effective means of weight reduction of communications conduits is one of the most urgent and critical problems facing aircraft designers, a problem of reducing design weight. One of these means is the efficient placement of equipment components.

Meanwhile, all questions related to the development of equipment arrangement variants in aircraft design are now basically resolved using heuristic methods: methods based on the traditions, intuition and experience of the design team. The expenditure of labor is great for arrangement studies, and the arrangement variants adopted as final designs are often not the optimum ones. In particular, the question of minimizing the weight of the interconnecting cables is not even the designer's option, notwithstanding the fact that the manual calculation of the weight of communications lines, even for two arrangement versions for several dozen equipment components, is nearly impossible within a reasonable amount of time.

The arrangement problem is one of optimum arrangement of geometric objects in confined spaces and possesses all the unpleasant attributes connected with such problems: multiextremality, large dimensionality and high informativeness. To accomplish a simple rearrangement and evaluation of a set of versions of arrangement schemes is impossible, even with the aid of modern computers, because of the infinitely large number of these versions. Furthermore, aircraft equipment arrangement problems have multiple criteria and require the consideration of both general and specific constraints.

Despite these difficulties, a reasonable approximation of geometric forms of equipment and aircraft, the engineering approach of constraints and the utilization of methods and means based on those proposed in [1] enable us to draw upon the computer in the process of planning aircraft equipment arrangement schemes.

What kind of results can be anticipated in this context? The quest for optimum design schemes enabled the Bell Corporation [2] to reduce the weight of the rudder and wing of the X-22A VTOL aircraft by about 35 percent. Reduction in the weight of the lunar landing training vehicle LLTV was about 12 percent. The use of methods of optimum planning of aircraft equipment arrangement schemes to obtain minimum weight in connecting leads would appear to produce savings on roughly the same scale. The savings could amount to millions of rubles.



Let us examine this approach as illustrated by the specific problem of arranging equipment components aboard an aircraft.

In modern aircraft there is a perfectly clear tendency to arrange equipment components (such as plants, cable junctions, etc.) on the shelves of the original stacks in specially insulated technical compartments [3]. The standard aircraft technical equipment compartment (Figure 1a, area 6) may be formed by the following areas (Figure 1b): 1) external fuselage sheath; 2) part of the fuselage used for running all kinds of control cables not connected to the given technical compartment; 3) crew passages; 4) subfloor space; 5) area for electrical cables runs. The size of the compartment is also limited fore and aft.

In region 6 it is necessary to place a certain number of equipment components so that the weight of their connective cables is minimum. The stack must be deesigned to accommodate these compoennts, laying of the shortest electrical connections and coordinated emplacement of equipment components on the stack. Equipment components include: pilot, navigation, radio communications equipments; junction boxes used for on-board communications, mechanical insulation, and completion and control of equipment maintenance; plug couplings for connecting stack equipment with the cable runs passing along the aircraft (region 6 in Figure 1b).

Thus a target function of the following kind must be minimized:

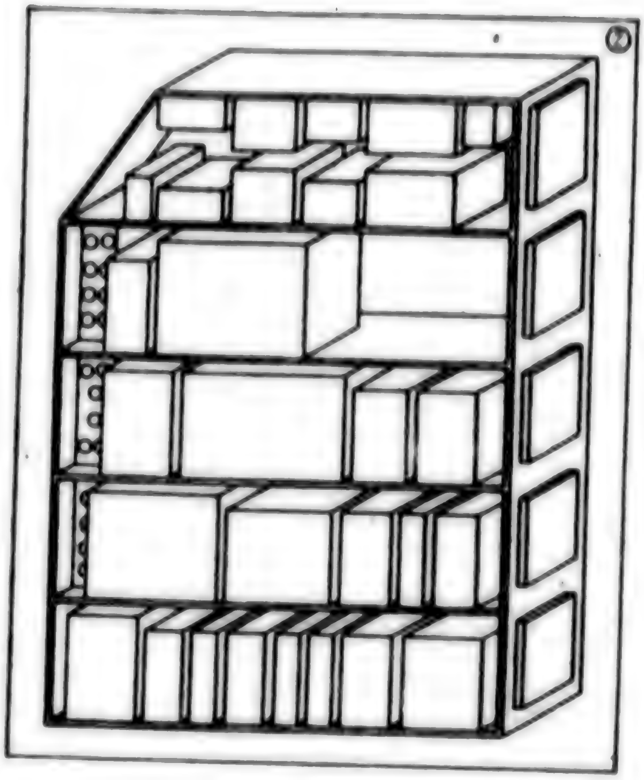
$$\kappa(\bar{X}, \bar{Y}, \bar{Z}) = \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \sum_{\psi=1}^{c_{ij}} \sum_{k=1}^{p} (\omega_{ij}^{\psi k} \delta_k (|x_{i\psi} - x_{j\psi}| + \\ + |y_{i\psi} - y_{j\psi}| + |z_{i\psi} - z_{j\psi}|)).$$

where $\bar{X}$, $\bar{Y}$, $\bar{Z}$ are vectors of equipment arrangement parameters in a given region, n is the number of equipment components; c_{ij} is the number of connections between the i^{th} and j^{th} components, and is given as a matrix of connections $C = ||c_{ij}||$, $c_{ij} = c_{ji}$, $c_{ij} = 0$ where $i = j$ $(i, j = 1, 2, \ldots, n)$; $\omega_{ij}^{\psi k}$ is the number of channels of k^{th} cross section and type $(k = 1, 2, \ldots, p)$ in a given psith (psi $= 1, 2, \ldots, c_{ij}$) connection between the i^{th} and j^{th} components; δ_k is the relative weight of the conductor of the k^{th} section and type; $x_{i\psi}$, $y_{i\psi}$, $z_{i\psi}$ are coordinates of the connection points of the i^{th} component in a stationary system of coordinates oxyz connected to the technical compartment. The kind of target function considers the actual route of cable connections which is made according to the design of the stack for attaching cables of the required rigidity in vibrating conditions.

Several constraints are imposed on arrangement parameters; we shall write expressions for them in the most general form because of their complexity and unwieldiness:

- equipment components should be arranged within a given technical compartment:

$$f_i(x_i, y_i, z_i, a_i, b_i, h_i) - g_i > 0, i = 1, 2, \ldots, n;$$



- mutual non-intersection of arranged elements must be guaranteed:

$$f_{ij}(x_i, y_i, z_i, a_i, b_i, h_i, x_j, y_j, z_j, a_j, b_j, h_j) - l_{ij} > 0,$$
$$i, j = 1, 2 \ldots n;\ i \neq j;$$

- the arranged elements must not intersect with prohibited areas within the technical compartment:

$$f_{it}(x_i, y_i, z_i, a_i, b_i, h_i) - d_{it} > 0,$$
$$i = 1, 2, \ldots, n,\ t = 1, 2 \ldots, q;$$

- distances l_{ij} (between components of given dimensions $a_{i(j)}$, $b_{i(j)}$, $h_{i(j)}$, d_{it} (between components and prohibited areas) and g_i (between components and aircraft design) consider various kinds of incompatibility (mechanical, thermal, electromagnetic, etc.) and may be assigned by matrices of minimally permissible distances $L = \|l_{ij}\|$, $l_{ij} = 0$ where $i = j$, $l_{ij} = l_{ji}$; $D = \|d_{it}\|$, $d_{it} = d_{ti}$; $G = \|g_i\|$;

- deviation of the actual position of the center of gravity of the system of arranged components from the nominal one (x_0, y_0, z_0) must not exceed a specific quantity Q_0;

$$F_i(x_0, y_0, z_0, x_i', y_i', z_i', m_i) - Q_0 < 0,\ i = 1, 2, \ldots, n,$$

where x_i', y_i', z_i' are coordinates the center of gravity of the i^{th} component, m_i is the weight of the i^{th} component.

The formulated problem was solved by the author using the M4030 computer for a specific composition of equipment on a real aircraft. The solution algorithm is based on the method of unit-series arrangement with asymptotic selection of local extremes [1]. The programming was done in FORTRAN. The algorithm was constructed so that during the process of retrieval of an optimal arrangement scheme there would automatically be created the appropriate design of the stack on which the equipment components are to be installed and optimum connective cable routes would be run. A figure of the stack with equipment components was reproduced from computer data by a YeS-7051 graphic plotter, and the information on the cable runs and coordinates the component arranagement was dumped on an alphanumeric printer. The number of equipment components is fifty-two units. Calculations and evaluation were made of about 600 arrangement versions. Computer time per version was two to three seconds. Weight economy of connective leads of the arrangement version obtained by optimization and shown in Figure 2 came to about 30 percent in comparison with the actual sitaution.

The problem is in question is theoretically a new one. The use of computers and special methods of retrieval permit us to consider all constraints usually utilized in design and furthermore, to optimize the arrangement scheme of aircraft equipment in terms of a criterion which was not at all considered before.

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PROGRESS ON POWERFUL NEW ESTONIAN COMPUTER SYSTEM

Tallinn SOVETSKAYA ESTONIYA in Russian 3 Jul 80 p 3

[Article by A. Favorskaya: "Operation El'brus"]

[Excerpts] The photograph [not reproduced] accompanying this article shows the new YeS-1052 computer installed at the Institute of Cybernetics of the Academy of Sciences Estonian SSR. This is only a temporary home for it, because in time the machine will be moved to a new building now under construction in the science city of Mustamyae. It will house the planned collective-use computing system of the Academy of Sciences Estonian SSR.

Despite the enormous capacities of the YeS-1052 (it "counts" at the rate of 700,000 operations a second, almost three times the speed of the fastest computer in the republic before it), this machine will not play the main role in the new system. The system will be based on a more powerful fourth-generation computer specially designed for this purpose. This is the El'brus-1, the first domestic multiprocessor computing complex. Its central processor does 1.5 million operations a second! And the machine can have up to 10 such processors, not counting "auxiliary" ones which also serve clients.

Ants Vyrk, deputy director of the Institute of Cybernetics of the Academy of Sciences Estonian SSR is in charge of work on the computing system.

Incidentally, the first delivery of equipment from the El'brus set has already arrived and some of it will be used even before the entire system is launched, to avoid lost time. The YeS-1052 machine is an example. The institute's socialist obligations for this year include introducing it.

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DEPUTY DIRECTOR DISCUSSES SCIENTIFIC PRODUCTION ORGANIZATION

Tashkent PRAVDA VOSTOKA in Russian 29 Jul 80 p 3

/Excerpts from article by Professor T. Bekmuratov, doctor of technical sciences, deputy general director, "Kibernetika" Uzbek NPO, Uzbek SSR Academy of Sciences: "The Effect of Introduction"/

/Excerpts/ The most effective way of improving communications between science and production is the scientific production association (NPO).

They have now been organized in different branches of the national economy and are operating successfully. It is necessary to emphasize that within the Academy of Sciences system in this country, the only such association in existence is in our republic. This is the "Kibernetika" /Cybernetics/ Scientific Production Association, which was created in March 1978. It consists of a Cybernetics Institute with a computer center, two special planning and design offices (for the development of automated systems for controlling technological processes and scientific experiments (SPKB-ASU) and the republic automated control system (SPKB-RASU)), and an experimental plant (OEZ) for the production of nonstandardized equipment that is needed for ASU's /automated control system/ on different levels and for different purposes.

Thus, the basic organizational and structural unit of the association is the scientific production complex (NPK), which unites the institute's scientific laboratory, related departments of the SPKB's /Special Planning and Design Office/, sections of the OEZ, and corresponding subunits of projects.

Such a structure makes it possible to establish clearcut dates for the issuing of the results of developments to enterprise projects and organizations on a timely basis and in a form that is convenient for the most rapid possible introduction. For instance, research related to the automated system for controlling mining operations has been concentrated in the "Gornyy" /Mining/ NPK, which consists of two laboratories at the Institute of Cybernetics with its computer center, two departments of the SPKB-ASU and a section for nonstandard equipment at the plant. The close connections between this NPK and the corresponding subunits of projects that are being introduced (at the Navoiyskiy and Almalykskiy mining and metallurgical combines) make it possible to correlate all the work being done at an early stage of its development and to shorten the period for the final publication of the results substantially.

The "Kibernetika" NPO has been in operation for a little longer than 2 years. The results of its work are indicative of the effectiveness and promise of such a structural and organizational form for scientific institutions. For 1978 and 1979 alone, the economic effect from the introduction of the association's work exceeded 25 million rubles. The projects introduced on the largest scales are the first stage of the republic automated control system for the Uzbek SSR, automated technological process control systems in the mining and metallurgical industry, automated systems for planning underground communication lines, and several others.
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AUTOMATED SCIENTIFIC RESEARCH DATA PROCESSING SYSTEM IN GEORGIA DISCUSSED

Tbilisi ZARYA VOSTOKA in Russian 16 Sep 80 p 2

[Article by G. Kharatishvili, director of the Institute of Control Systems of the Georgian SSR Academy of Sciences, chairman of the Commission on Computer Technology under the Presidium of the Georgian SSR Academy of Sciences, and corresponding member of the Georgian Academy of Sciences; and N. Kipiani, chief designer of the automated system for collective use of the Georgian SSR Academy of Sciences, candidate of engineering science: "Automation of Research"]

[Excerpts] The ASU [automated management system] is a powerful means for raising economic efficiency in any sector. It is enough to cite the example of the Georgian SSR Ministry of Construction. The economic efficiency of this ministry's enterprises that have switched to a system for automated management of hauling concrete, asphalt and mortar amounts to more than 900,000 rubles per year.

The efficiency of the principle of operation of territorially distributed computing systems was adopted in our republic too: As early as 1975 at the Institute of Control Systems of the Georgian Academy of Sciences, studies were begun on the possibility of setting up VS [computing systems] to process data from scientific experiments underway within the framework of the republic's Academy of Sciences. Preliminary analysis convinced us very quickly that 17 institutes in the system of the Academy of Sciences have a critical need for automation of data processing.

Our institute became the main, i.e., the chief executive agency for setting up an automated system of collective use for processing scientific research data. A number of scientific instituions in the Georgian Academy of Sciences became coexecutors in the first stage: the Institutes of Physics, Cybernetics, Physiology, Mining Mechanics, Construction Mechanics and Seismic Stability, the Computing Center and the Abastumani Astrophysics Observatory.

A few words on the structure of the computing system. The plan called for setting up a distributed computing network, consisting of four computing centers, on a territorial principle. There were good reasons for this. Four centers made up the basis of the computing system. These are basically four scientific organizations of the republic's Academy of Sciences: the Computing Center and the Institutes of Physics, Cybernetics and Control Systems. These are the bases where adequate computer capacity has been concentrated. The plan called for "connecting" the remaining organizations, who do not have their own computers or have so-called small machines, to collective-use computing centers by a radical principle. It was planned to tie them in by communication channels and terminals or else subscriber stations installed at the institutes. In future, these four VTsKP [collective-use computing centers] are to be combined into a so-called ring network with decentralized control. This will enable optimum utilization of the computer equipment.

This is the strategy used as the basis for developing the system and putting it into operation by stages. The first stage will be implemented by the end of 1980, and the second stage by the end of 1985. It can be called fundamental based on the fact that the capabilities of the four isolated collective-use computing centers will be considerably expanded through teleprocessing of scientific research data. Practical operation of the third computing system will begin by the end of 1990. In this stage, the four collective-use centers will be combined into a single computing network with a single control system. Thus, the capability will emerge for rational redistribution of system capacity and providing for solving the most major problems.

First stage work is already being completed now. In the Institutes of Physics and Cybernetics and in the Computing Center, third-generation computers and a number of minicomputers performing the functions of so-called intelligent terminals have been put into operation. Intensive work is underway on setting up communications between the collective-use computing centers and the individual institutes which are also making their substantial contribution to establishing the computing system. Take, for example, the Institute of Physics. With the base of existing computers, its specialists are completing construction of an automated system for processing the data of experimental installations; in our institute, a system for processing data for a speech pattern recognition system has been developed, and work is being completed on developing devices for acquisition, conversion and storage of information intended for physiologists, etc.

It is well known that complex automated systems require specialists with special skills--programmers, system engineers and others. Meanwhile, there has been a "dearth" of specialists with exactly these skills in our republic for a long time. [36-8545]

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URBAN MANAGEMENT AUTOMATED CONTROL SYSTEM PROBLEM SOLUTIONS SUGGESTED

Moscow IZVESTIYA in Russian 8 Aug 80 p 2

[Article by E. Vartapetov, director, Yerevan Scientific Research and Planning Institute of Automated Urban Management Systems, and candidate of physical and mathematical sciences, Yerevan: "Automated Control Systems and City Services"]

[Excerpts] The management of urban services is a complicated job for the ispolkoms of soviets of people's deputies. And now it requires improvement.

The coordination of work along this line is reasonable. And this work is being carried out within the framework of an urban services ASU [automated control system] section of the USSR State Committee on Science and Technology. Under the leadership of Doctor of Technical Sciences Professor V. Myasnikov, during a short time this section has solved many methodological problems relating to the creation of combined automated control systems.

The importance and complexity of the problem of introducing a combined ASU and its capital intensiveness require the transition to a still higher level of work--from methodological integration to organizational integration. For this purpose it would be desirable to create an all-Union scientific production association (NPO) based on organizations of this sort already created in Moscow, Leningrad, Kiev, Tashkent, Yerevan and Sverdlovsk. It would assume responsibility for a scientific solution to questions relating to improving management of the economy of large cities. Within the framework of an all-Union NPO it is possible, it is believed, to settle many questions relating to legal, financial and management support. This association will be able to develop and circulate really effective systems, unifying for the entire country processes for the functioning of specific elements of the economy

A self-supporting all-Union NPO would put an end to the presently uncontrolled process of taking over from one another occasionally unsubstantiated control structures, systems and procedures. The approach suggested will raise an obstacle to the spontaneous origin of low-capacity organizations in various cities of the country, attempting with a low number of personnel under conditions of limited resources to solve complex problems relating to improving the management of an urban economy. It is believed that the creation of such an NPO will help soviets of people's deputies to cope even more successfully with the large and important problems confronting them.
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UTILIZING COMPUTER TECHNOLOGY IN ADMINISTRATION

Moscow AVTOMOBIL'NYY TRANSPORT in Russian No 7, Jul 80 pp 1-4

/Excerpts from article by M. L'vin, chief, Glavasuavtotrans republic association/

/Excerpts/ In accordance with the plans for the development of the USSR's national economy in the Ninth and Tenth Five-Year Plans, RSFSR Minavtotrans /Ministry of Motor Transport/ has done a great deal of work to create computer centers and automated control systems and to introduce computer technology into the transportation process. It has set up an integrated branch "ASU-avtotransport" /automated control system-motor transport/ system that encompasses all administrative levels. Automated systems for controlling the ministry, transport administrations (ASU TU), motor vehicle repair plants (ASUP), and the technological processes involved in transporting cargoes and passengers in cities (ASU TP) (in motor vehicle transport these are known as automated, centralized traffic control systems (ASDU)) are being developed on the basis of a single methodological, informationa, programming and equipment base.

At the present time, the first stage of the ministry ASU /automated control system/ is in operation and 16 transport administration ASU's and 5 motor vehicle repair plant ASUP's have been introduced and are being developed. Bus system ASDU's have been set up in Omsk, Sverdlovsk, Nal'chik and Kazan', while taxi system ASDU's have been put into operation in Rostov-na-Donu and Leningrad. The basic elements of the technological processes for collecting, transmitting and processing information have been worked out and approved and more than 1,000 problems have been solved in the areas of operational planning for freight and passenger transportation, the integrated processing of widely used transport documentation, planning calculations, accounting and analysis of the financial and production activities of enterprises, and so on. For the ministry as a whole, more than 1,000 motor transport enterprises belonging to 60 transport administrations are using solutions that have been worked out on computers.

The use of computer technology and the creation of automated control systems enabled the ministry to improve its service to the national economy and the populace and to improve the working indicators for the utilization of motor vehicle transport and labor and material resources. As a result of the implementation of these measures, the money saved last year amounted to 20.3 million rubles; this was accompanied by a savings in labor of about 9,000 people.

However, computer technology still has not become an effective tool for improving the economic indicators of the ministry's activities and the quality of the transportation process. Some transport administrations are not making full use of the available capabilities of computer technology.

In the activities of the interconnected computer centers, including the management by the transport administrations, there are serious shortcomings that reduce the effectiveness of the utilization of computer technology to improve the transportation process. The progressive experience amassed at the Saratov, Bryansk, Moscow, Gor'kiy and Sverdlovsk interconnected computer centers is not being disseminated widely enough. Some transport administrations are not making full use of the available engineering and economic developments and experience that has been gained in solving optimization problems.

The volume of freight shipments realized with the help of computer technology remains low, and for the ministry as a whole does not exceed [illegible] percent of the volume for which plans can be made, while in some transport administrations (Kursk, Penza) it is at a level of 8-10 percent. Some transport administrations that have computer centers have paid insufficient attention to studying and introducing progressive working methods that insure high efficiency in the utilization of computer technology to improve the technology of the transportation process, to automate statistical and accounting work, planning calculations and material and technical supply requisitions, and to reduce the manual labor involved in the performance of the labor-intensive work related to investigating passenger traffic, calculating schedules and bus timetables.

The introduction of computer technology has been delayed considerably by the presence of serious inadequacies in the organization of centralized shipments and the preparation of fronts for the loading and unloading of motor vehicles. The transport administrations are doing rather poor work in preparing the motor transport enterprises and their clientele, as well as the administrations themselves, for the reorientation of the transportation process to the conditions imposed by the functioning of ASU's and efficient regulation of the work done by each driver and each vehicle. The introduction of computer technology and automated control systems is frequently not accompanied by the necessary changes in the organizational structure and administrative methods.

The transport administrations and motor transport enterprises are inadequately equipped with communication and remote data processing facilities, which, under the conditions imposed by the extent of the territory over which the ministry's enterprises are located, is of great importance for organizing the timely processing of information at the computer centers.

This is explained largely by the low rates of automation of the systems for processing statistical, planning and financial information.

One of the factors that is delaying the extensive use of computer technology is the absence of a system for materially stimulating the workers at the motor transport enterprises to work under the conditions imposed by a functioning ASU.

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THE AUTOMATED CONTROL SYSTEM IN MOTOR TRANSPORT

Moscow AVTOMOBIL'NYY TRANSPORT in Russian No 8, Aug 80 p 18

/Excerpts from article; author not listed/

/Excerpts/ In the solution of problems to improve the administration of this country's national economy, automated systems and the widespread introduction of computer technology rightfully occupy an important place. The introduction of ASU's /automated control system/ in transportation, which has become one of the most important branches of the national economy, is of special importance. Transportation's share of the national economy is 20 percent of the fixed capital, about 12 percent of the energy resources that are consumed and almost 9 percent of the total number of workers in the economy. In connection with this, motor vehicle transport plays a large role in view of the fact that at the present time it is involved in the transportation of more than 80 percent of all freight shipments.

Within the framework of the "ASU-avtotransport" /automated control system-motor transport/ branch automated motor vehicle transport control system, RSFSR Minavtotrans /Ministry of Motor Transport/ is using the forces of 32 interconnected computer centers (KVTs) to solve more than 1,000 problems that can be provisionally divided into the following groups: improving freight and passenger transportation; monthly and annual planning and norm-setting for motor transport work; processing widely used travel and commodity-transportation documentation; improving the technical status of transport facilities; registering and analyzing the activities of motor transport subunits.

All of the KVTs's are equipped with second- and third-generation computers, and many of them have received YeS EVM /Unified System of Computers/ equipment.

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A COMPUTER PLANS CONTAINER SHIPMENTS

Moscow AVTOMOBIL'NYY TRANSPORT in Russian No 8, Aug 80 pp 22-23

/Excerpt from article by V. Tananykin, Interconnected Computer Center, Privolzhsk Freight Transportation Administraction/

/Excerpt/

YeS-1020 computer operator at the Saratov Interconnected Computer Center.

Let us discuss the railway container shipment planning and control system that was developed and introduced and has been in operation at the Saratov-II Railroad Station since 1977. The system provides for the daily planning of rational routes for the movements of motor vehicles and container-carrying trains, with coordination of the operations of the railroad workers and more than 300 clients.

In order that it can carry out operational control of the shipping process, the control center is equipped with the necessary equipment for communicating with clients and drivers who are working on the line. All of its motor vehicles are equipped with radio sets, which makes it possible for the control center's dispatcher to monitor the implementation of shipments. In order that remote sections of the container holding point may be observed, television is used in the control center's dispatching room.

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FIRST USSR ELECTRONIC OFFICE CREATED IN MINISTRY OF ELECTRICAL EQUIPMENT INDUSTRY

Moscow MOSKOVSKAYA PRAVDA in Russian 6 Sep 80 p 3

[Article: "The First Electronic Office"]

> [Text] September 4, Thursday. Specialists from the Moscow Informelektro Institute have completed development of a new complex of programs for the original automated system for processing office correspondence. This is the first time that such a unique electronic office has been developed in our country. It will serve as an experimental model to gain experience that can be used to set up such systems in institutions, ministries, departments and in offices where employees prepare responses to letters.

. . . "Input document number" flashed on the display screen. The office worker pressed the keys and the computer wrote the input number for the letter on the screen. Another touch of the keys and the computer records the content of the document.

We are in the automated information-dispatch center of the USSR Ministry of the Electrical Equipment Industry. Incoming and outgoing letters are processed here by computer. And this correspondence is extensive and varied. After all, the sector is the largest supplier of electrical equipment for power engineering, metallurgy, transportation and agriculture. Hundreds of plants send their products to chemists, miners and builders. About 300 major letters come in daily to the main headquarters of the sector--the ministry. And each one has to be recorded, examined and sent to executives. Then in the reverse order, the response to the letter is returned to the office and sent to the addressees.

The new system was developed by Informelektro scientists under the direction of Professor I. A. Bol'shakov, doctor of engineering. The letters arriving here go first to operators who "write" the number, text and accompanying data of the letters on a display screen. This information goes instantly into a computer. The computer stores it and then prints out data on a special little card that is attached to the letter. The letter with the card is sent to a supervisor. After examination, the text of the letter and instructions are again input into a computer. It processes this information and sends it to displays installed in the functional administrations of the ministry, to where the letter is addressed. After familiarizing himself with the text, an executive prepares a response which is also input to the computer. Ministry specialists can access the document text at any time on a display screen by just asking the computer for it. The computer can also select a whole series of required documents, display them on a screen and select specific data on the pertinent subject from a set of responses. Operation with the computer is performed in the conversational mode. One asks the computer questions and it answers them, explaining how a specific document can be located more rapidly and by what descriptors.

Specialists say this new system is not just a synthesis of computer and office workers. It is an expeditious and efficient mechanism that controls the flow of office correspondence. The new system also enables efficient monitoring of the periods for letter responses. Twice a month the computer provides a complete report showing in which division of the ministry letter responses have been prepared and where they are delayed. As a result, not only office operating efficiency is raised but that of all ministry services as well. Less time is spent on processing and sending letters. After all, the computer is better than any clerk in keeping track of drawing up correspondence and quickly analyzing and sorting it. The electronic office saves a substantial amount of paper and labor spent on processing letters is reduced.

In the future, these systems may be operating successfully in enterprises, institutes and institutions. General-purpose computer programs for automated processing of documentation could be used in all sectors of the national economy.
[36-8545]

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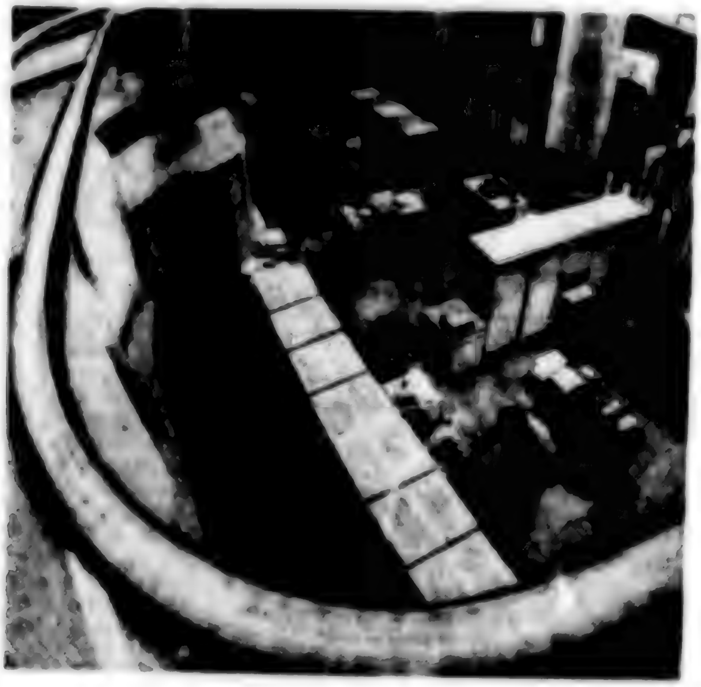
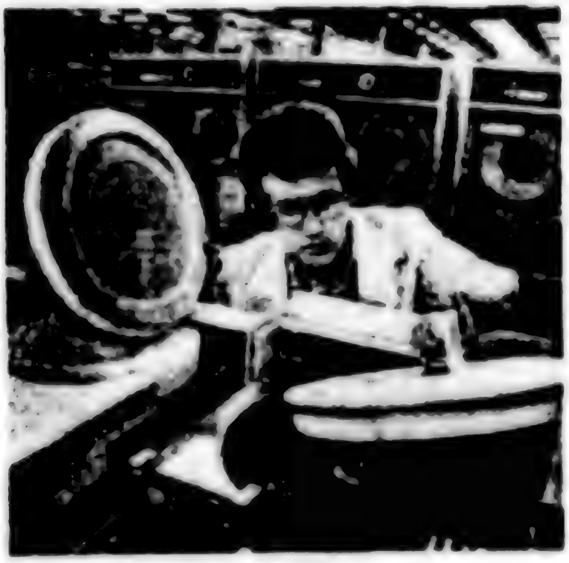
NEW COMPUTER SYSTEMS TO AID METALLURGISTS, POWER ENGINEERS

Moscow PRAVDA in Russian 5 Oct 80 p 2

[Article: "Computer Gives Advice," photos by V. Voronin and V. Lesnoy]

[Text] An adviser to steel founders is the new automated system for control of industrial processes under development by specialists of the Pavlodarskiy branch of the Institute of Automated Systems for Control of Industrial Processes. It will operate on the base of a general-purpose computer and facilitate the work of metallurgists in many ways (photograph below).





The photograph above was taken in the shop for autonomous and comprehensive adjustment of control computers in the instrument-making plant of the Severodonetsk Impul's Scientific Production Association imeni the 25th CPSU Congress. Electronic computer equipment is developed here. The machine manufactured at the plant aid metallurgists and power engineers.
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INFORMATION AND CONTROL CENTER (IUTs) CONCEPT INITIATED AT KUYBYSHEV PLANT

Moscow PRAVDA in Russian 18 Oct 80 p 2

[Article: "The Computer in the Field of Control"]

[Excerpt] Having received a high rating by specialists is the combination of work relating to automation of the control of production performed at the Kuybyshev Plant imeni Maslennikov (ZIM) Production Association with the participation of the Tula Scientific Research Institute of Control Systems. PRAVDA correspondent V. Shvetsov spoke regarding the features of the ASU [automated control system] introduced with Scientific Research Institute of Control Systems Director V.N. Zasypkin, Computing Center Director S.K. Yakubovich and Association General Director A.V. Kurbatov.

"Together with abbreviations which for a long time have not required expansion, such as OTK [department of technical control] or SKB [special design bureau], in the plant lexicon has already been approved IVTs--information and computing center," notes the interlocutors in Kuybyshev. "But in our association it is called something different--IUTs [information and control center]."

The difference, however slight, is fundamental. The IVTs must be considered a stage which has been passed, a computer deed. Computing manipulations and the gathering, processing and output of information, because of which the first computers and centers were created, are an important and necessary thing, without which modern production is simply unimaginable. But this, as they say, is a problem for the first grade. Today many talk about the low effectiveness and unprofitability of computing centers. This talk is not without basis. It is a question precisely of those computing centers which hitherto, if it is possible to say so, have worn the short pants of the most simple processing of data about a thing done. But the modern level of electronic technology makes it possible to influence actively and directly production itself--not only its organization, but also its technology. Herein lies the essence of the variant readings IVTs and IUTs. In the Kuybyshev association has been created not a simple information and computing, but an information and control center.
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GRAIN HARVESTING, TRANSPORT, STORING AUTOMATED CONTROL SYSTEM ANNOUNCED

Moscow EKONOMICHESKAYA GAZETA in Russian No 39, 1980 p 19

[Article by V. Gol'dman, agronomist: "By Means of an Automated Control System"]

[Text] In Kiev Oblast for the first time in the Ukraine has been introduced centralized control by means of an automated control system (ASU) of crop harvesting and of transporting and storing grain.

On the teletype tape appear constantly new lines of figures. The teletype records data on at which farms and which amount of grain has been made ready for transportation to the grain receiving station, on the presence of vehicles which will transport the harvest, and on the furnishing of threshing stations and grain receiving stations with equipment for loading and unloading grain. Thus it is known in good time when, how many and exactly what kind of motor vehicles are to be sent to specific farms, in order for a definite harvesting tempo to be maintained in all sections of the grain production flowline.

Specialists have estimated that the savings from introducing computers will be greater than 100,000 rubles for the oblast, and that because of optimal planning of the work of motor transportation the vehicle requirement will be reduced by not less than 1000. For the time being the automated control system has been operating in seven rayons of the oblast. Next year it is intended to use this advanced method in all rayons.
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COSTS, EFFICIENCY OF SETTING UP AUTOMATED INDUSTRIAL CONTROL SYSTEMS

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 7, 1980 pp 45-54

[Article by Ye. Stefan, director, and M. Gornshteyn, division chief, of the Central Scientific Research Institute of Full Automation: "The Efficiency of Automating Industrial Technology and Ways To Raise It"]

[Excerpts] Of the ASUTP's [automated systems for control of industrial processes], the extracting and processing sectors of industry account for 51 percent, machine building has 33 percent, and the remaining sectors have 16 percent. During the current five-year plan the number of these systems, compared to the Ninth Five-Year Plan, will increase 1.7 times in the power industry, two times in petroleum refining, 2.8 times in petrochemistry, 1.8 times in ferrous metallurgy, 2.7 times in nonferrous metallurgy, and 1.8 times in the chemical industry.

Building these systems will demand significant labor, material, and financial resources. In the Ninth Five-Year Plan capital investment for one ASUTP with computers averaged 1,030,000 rubles; in the 10th Five-Year Plan this figure reached 1,460,000 rubles. Table 1 (next page) gives estimates of the average costs of setting up ASU's [automated control systems] for continuous and continuous-discrete industrial processes and works using the classification proposed for intersectorial planning.

Technical-economic analysis of the functioning of these systems based on the methodological principles set forth above shows their high economic efficiency. Rapid payback of capital investment for setting up ASUTP's, in 1-3 years, is insured by increasing production of output 2-8 percent, reducing raw and processed material and fuel-energy costs by 2-5 percent, improving the quality of output, reducing or completely eliminating waste material and defective products, and so on.

Table 2 (below) gives the structure of the annual savings obtained from the functioning of the ASUTP. The table shows that the factors enumerated above are the principal components of the savings.

Table 1

Index*	Brief Description	Industrial Object of Control	Average Costs To Set up Pilot System of Appropriate Type, rubles				
			Total	A	B	C	D
1	ASU's for Industrial Installations, Aggregates, and Units with Few (up to 40) Measured and Monitored Variables	Electrosmelting, Holding Furnaces, Section and Rod Mills, Rectification Column	270,000	100,000	30,000	20,000	120,000
2	Same, with Small Number (up to 160) Number of Variables	Convertor, Chemical Reactor	610,000	150,000	50,000	60,000	350,000
3	Same, with Average Number (up to 650) of Variables	Primary Petroleum Refining, Ethylene Production Units	1,350,000	250,000	80,000	120,000	900,000
4	Same, with Greater Number (up to 2,500) of Variables	Thermal Power Unit, Blast Furnace	2,950,000	450,000	150,000	250,000	2,100,000
5	Same, with Large Number (more than 2,500) of Variables	Atomic Power Unit	5,800,000	1,100,000	350,000	450,000	3,900,000

(Table continued, next page)

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* Index Number of Consolidated ASUTP Class

(A) Scientific Research and Experimental Design Work;
(B) Design and Planning;
(C) Installation and Debugging;
(D) Equipment.

(Table 1, continued)

In-dex*	Brief Description	Industrial Object of Control	Average Costs to Set up Pilot System of Appropriate Type, rubles				
			Total	A	B	C	D
6	ASU's for Groups of Industrial Aggregates (Works, Shops) Not Including in Their Composition ASUTP's of Classes Nos 1-5	Production of Sulfuric Acid	1,610,000	350,000	110,000	150,000	1,000,000
7	Integrated ASU's for Comprehensive Industrial Objects (Works, Shops, Conversions) Including ASUTP's of Classes Nos 1-5 at the Lower Level and Class No 6 at the Higher Level	Convertor Shop, Concentrating	4,150,000	1,200,000	300,000	350,000	2,300,000

Table 2 (in percentages)

One-Time Investments in Building the ASUTP	
Scientific Research and Experimental Design Work	25
Design and Planning	7
Installation and Debugging	9
Hardware	59
Total	100
Ongoing Costs of Operation of ASUTP	
Depreciation of Fixed Capital	52
Current Repair and Maintenance of Fixed Capital	25
Wages of Service Personnel	18
Other	5
Total	100
Annual Savings from Operation of ASUTP	
Reduction of Expenditures of Raw and Processed Materials and Fuel-Energy	50
Increase in Production of Output	30
Increase in Product Quality	15
Other Factors	5
Total	100

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BRIEFS

'ELEKTRO-3' OASU THIRD PHASE--The interdepartmental commission has accepted for industrial service the third phase of the "Elektro-3" OASU [automated control system for a sector of industry]. Its introduction ahead of schedule represents a gift of labor from the team of the Moscow Informelektro [Central Scientific Research Institute of Information and Technical and Economic Research in Electronic Engineering] Institute to the 26th CPSU Congress. The use of the new system will make it possible to solve many problems in controlling the electrical equipment industry. The computer in its control role will make it possible to control the economic activity of hundreds of electrical equipment enterprises, many Moscow ones among them, too. It will look after product quality, the consumption of raw material and materials and the introduction of new equipment. Under its strict control are shipments of electrical equipment to industry and agriculture. Planning is being improved and material resources are being economized on. The savings from introducing this new system is almost 13 million rubles per year. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 4 Nov 80 p 3] 8831
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STATE SOFTWARE BANK'S IMPROVEMENT UNDER DISCUSSION AT CONFERENCE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 26 Sep 80 p 2

[Article: "For the Country's Computer Inventory"]

[Text] The first all-Union conference which opened on 25 September in Moscow is devoted to improving the State Data Bank of Algorithms and Software (GOSFAP), which plays the role of the storer and circulator of ready software for computers.

"Today in the country's national economy," GKNT [State Committee on Science and Technology] Central Administration for Computer Technology and Control Systems Deputy Director B.I. Rameyev told a TASS correspondent, "is used a large inventory of computers. To reach their maximum effectiveness in a job is not a simple matter. To an enormous extent this depends on the existence of software for solving specific problems."

The foundations for the State Data Bank of Algorithms and Software in our country were laid in 1966. Now GOSFAP represents an unprecedented system on the nationwide scale, in which are included several large interindustrial, dozens of industrial and a number of republic data banks of algorithms and software. They serve more than 10,000 organizations and enterprises, assisting them in solving economic, engineering and technical, scientific and other problems.

Participants in the first all-Union conference on the problem of the State Data Bank of Algorithms and Software, said B.I. Rameyev in conclusion, will discuss the experience gained in the organization and practical operation of data banks and will point out ways of further developing GOSFAP and of improving in connection with this the effectiveness of the utilization of computer technology in the country's national economy.
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CEMA STATE PLANNING AGENCY ASPR CONFERENCE IN TASHKENT ANNOUNCED

Tashkent EKONOMIKA I ZHIZN' in Russian No 6, 1980 pp 2-37

[Article: "The First Conference of Experts on ASPR's [Automated Control Systems for Planning Calculations] for State Planning Agencies of CEMA Member Countries Has Convened in Tashkent"]

[Excerpts] Automated systems for planning calculations (ASPR's) make it possible to raise to a qualitatively new level the work of planning agencies.

Work to be performed by the central planning agencies of socialist countries relating to the automation of planning calculations is being done by the manpower of specialized organizations or of individual subdivisions of the planning agencies themselves. For example, in the state planning committee of the People's Republic of Bulgaria the major performer is the Scientific Planning Center, in the state planning commission of the German Democratic Republic--the Department for Preparing for the Utilization of Computer Technology and the Computing Center, and in the central planning council of the Republic of Cuba--the Computer Technology Administration.

The CEMA committee for cooperation in the field of planning work has convened in the capital of the Uzbek Soviet Socialist Republic the first conference of experts on questions relating to ASPR's for the state planning agencies of CEMA countries.

Having arrived in Tashkent for the purpose of participating in the conference's proceedings are the delegations of the People's Republic of Bulgaria, the Hungarian People's Republic, the German Democratic Republic, the Republic of Cuba, the Mongolian People's Republic, the Polish People's Republic, the Socialist Republic of Rumania, the Union of Soviet Socialist Republics, the Czechoslovak Socialist Republic, and also the CEMA secretariat.

In this issue we report in detail on the work of the conference of experts on questions relating to ASPR's and on the meetings of its participants on Uzbek soil.

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